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ABSTRACT

Each volume of this three-volume set is divided into two major sections. The first section presents the narrative report of a study designed to assist Michigan vocational agriculture teachers in implementing local competency-based vocational agriculture programs by (1) developing student performance objectives; (2) identifying up-to-date reference materials for teaching agricultural production, agricultural mechanics, and ornamental horticulture; and (3) developing a delivery system and materials to provide competency-based education training. The second section, which comprises the bulk of the document, contains three appendixes: student performance objectives, selected references for teachers, and a key to finding the sources. This first volume presents the identified objectives and reference materials for teaching agricultural production. The other two volumes contain the objectives and reference materials for teaching agricultural mechanics (CE 016 908) and ornamental horticulture (CE 016 909). (BM)

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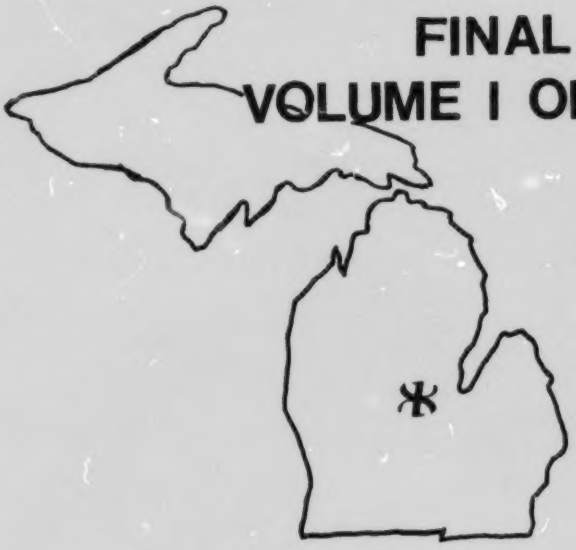
ED159356

STUDENT PERFORMANCE OBJECTIVES AND SELECTED REFERENCES FOR TEACHING AGRICULTURAL PRODUCTION

FINAL REPORT
VOLUME I OF III VOLUMES



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JUNE, 1976

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STUDENT PERFORMANCE OBJECTIVES AND SELECTED REFERENCES FOR TEACHING AGRICULTURAL PRODUCTION

Volume I of III Volumes

Final Report

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June, 1976

This project was funded by the Michigan Department of Education, Vocational-Technical Education Service, under the project title "The Development of a Delivery System and Materials to Provide Competency-Based Education Training for Michigan Vocational Agriculture Teachers".

ACKNOWLEDGEMENTS

Since the inception of the project, many individuals and agencies have made significant contributions to the development of materials included in the final report. The project director wishes to express his appreciation to those who have contributed to the completion of the project.

First, sincere thanks is extended to the project staff for their conscientious efforts throughout the study. Namely, Messrs. Raymond J. Clark and Richard Nysteun, Graduate Assistants, Agriculture and Natural Resources Education Institute, Dr. Raymond M. Clark, Project Consultant, and Mrs. Sandi Bauer, Project Secretary.

Second, gratitude is expressed to Dr. Carroll H. Wamhoff, Director, Agriculture and Natural Resources Education Institute, and his staff, for assistance in the administration of the project.

Third, appreciation is granted to Robert Weishan, Supervisor, Charlie Langdon, Chief, and Richard Karelse, Specialist, Michigan Department of Education, Vocational-Technical Education Service, for their direction during the preparation of this document.

Finally, gratitude is expressed to the many public and private agencies whose cooperative support made this report possible.

Dr. Eddie A. Moore
Project Director

ABSTRACT

Title of Project: Development of a Delivery System and Materials to Provide Competency-Based Education Training for Michigan Vocational Agriculture Teachers

Project Staff: Eddie A. Moore, Assistant Professor and Project Director
Raymond J. Clark, Graduate Assistant
Richard M. Nysteun, Graduate Assistant
Raymond M. Clark, Project Consultant
Sandi L. Bauer, Project Secretary

Beginning and Ending Dates: January 1, 1976 through June 30, 1976

Purpose: To assist Michigan Vocational Agriculture Teachers (those employed and those in pre-service training) in acquiring the knowledge, information, and skills needed to implement local competency-based vocational agriculture programs.

Statement of Objectives: (1) To prepare a summary publication of a study conducted by Dr. William L. Thuemmel and other researchers which focused on the annual agricultural employment needs in Michigan for 1974 through 1979 and the characteristics of vocational agriculture programs in the state; (2) To develop student performance objectives and identify up-to-date reference materials for teaching Agricultural Production, Agricultural Mechanics, and Ornamental Horticulture; and (3) To develop a delivery system and materials to provide competency-based education training for Michigan teachers of vocational agriculture.

Description of Activities: A summary report of the study of Dr. Thuemmel and other researchers which focused on the agricultural employment needs for

a five-year period and the characteristics of Michigan vocational agriculture programs was prepared. Student performance objectives were developed and reference materials (eight-hundred or more publications were reviewed and evaluated) identified for three vocational agriculture instructional areas. A delivery system and materials were developed to provide competency-based education training for Michigan vocational agriculture teachers.

Contribution to Education: The summary publication is available for use by school administrators, Career Education Planning District coordinators, teachers of vocational agriculture, state department personnel, teacher edcuators and other individuals interested in long-range planning of vocational agriculture programs. Student performance objectives and selected references are available for improving the teacher/student learning process in three instructional program areas. Strategies for making Michigan vocational agriculture programs competency-based are available for implementation.

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THE NARRATIVE REPORT

Problem

In recent years, the Michigan Department of Education, Vocational-Technical Education Service has actively attempted to improve the quality of vocational education programs in Michigan. One approach used by the Vocational-Technical Education Service to improve the quality of vocational programs was the writing of student performance objectives. In the early 1970s, selected teachers representing service areas in the state were used in writing minimum state performance objectives. Many local vocational personnel adopted the state minimum performance objectives as a basis for operating accountable programs. Some local vocational educators elected to write their own student performance objectives. It has been stated by some local and state educators that the efforts spent in writing performance objectives in the early 1970s did in fact improve the quality of vocational education instruction in Michigan.

Because of rapid changes in agriculture and the need to prepare better graduates for filling various agricultural positions, the quality of vocational agriculture programs in Michigan were assessed during the 1974-75 academic year by Dr. William L. Thuemmel and other researchers. One objective of the study titled "Agribusiness and Natural Resources Education in Michigan: Manpower Needs, Competencies Needed, School Program Characteristics" was to "determine the competencies needed for entrance in agriculturally related jobs". A task analysis process was used to identify and validate competencies needed by beginning workers for entry into a cluster of agricultural occupations for

the following United States Office of Education (USOE) program areas: (1) Agricultural Production; (2) Agricultural Mechanics; and (3) Ornamental Horticulture. While examining some of the preliminary data reported by Dr. Thuemmel and others, it was deemed appropriate that a delivery system was needed to assist Michigan vocational agriculture teachers in the implementation of Competency-Based Instruction. During the latter months of 1975, representatives from the Michigan Department of Education, Vocational-Technical Service, faculty from the College of Agriculture and Natural Resources and the College of Education at Michigan State University held a series of meetings and agreed on a strategy for making vocational agriculture programs in Michigan Competency-Based. A proposal for carrying out this strategy was funded and the project begun in January, 1976.

Purpose and Objectives

The purpose of the project was to assist Michigan vocational agriculture teachers (those employed and those in pre-service training) in acquiring the knowledge, information, and skills needed to implement local competency-based vocational agriculture programs.

The primary objectives of the project were:

1. To prepare a summary report of a study conducted by Thuemmel and other researchers which focused on:
   a. Agricultural manpower needs (primarily for Michigan high school vocational agriculture graduates) for 1974 through 1979.
   b. Competencies needed by Michigan high school vocational agriculture graduates in order to enter various agricultural occupations.
   c. Congruencies and differences in existing vocational agriculture programs.

2. To develop student performance objectives based on the Thuemmel study and studies completed by other agencies, and identify up-to-date reference materials for teaching the following United States Office of Education vocational agriculture program areas:
   a. Agricultural Production
   b. Agricultural Mechanics
   c. Ornamental Horticulture
3. To develop a delivery system and materials to provide competency-based education training for Michigan vocational agriculture teachers.

Description of Activities

The project consisted of three activities: (1) Preparation of a summary report which focused on the manpower needs for Michigan high school vocational agriculture graduates and the quality of programs in the state; (2) Preparation of student performance objectives and the identification of reference materials for three vocational agriculture program areas; and (3) The development of a delivery system and materials to provide Competency-Based Education training for Michigan vocational agriculture teachers. Further discussion of each activity follows.

Summary Report.--A comprehensive research project titled "Agribusiness and Natural Resources in Michigan: Manpower Needs, Competencies Needed, and School Program Characteristics", was conducted by Thuemmel and other researchers during the 1974-75 academic year. Because of the terminology used in addition to being a lengthy final report (nearly 400 pages), a summary document which consist of approximately 40 pages has been prepared. In general, the summary report consist of the following: (1) Purpose and Objectives;

(2) Statements regarding the need for the study; (3) Methodology used; (4) Major findings; and (5) Recommendations. Persons interested in receiving a copy of the summary report should write to: Agriculture and Natural Resources Education Institute, 410 Agriculture Hall, Michigan State University, East Lansing, Michigan 48824.

Student Performance Objectives and Reference Materials.--In developing and compiling student performance objectives for the three instructional program areas (Objective 2), the project staff primarily used the task analysis results from the study conducted in 1974-75 by Dr. Thuemmel and other researchers at Michigan State University. Other sources used in developing student performance objectives for this project were as follows:

1. Amberson, Max L., Bishop, Douglas D., and Agocs, Barbara. Competency Commonalities and Accompanying Job Titles Derived from the Six Montana Agricultural Manpower Studies. Bozeman, Montana: Department of Agricultural and Industrial Education, Montana State University, 1975.

2. Bristol, Benton K. Volume III--Program Planning Guide in Agricultural Mechanics. Carbondale, Illinois: Southern Illinois University, 1975.

3. Moore, Eddie A., et al. A Study of Job Demands and Curriculum Development in Agricultural Training Related to the Muskegon County Wastewater Management System. Vol. III: Student Terminal Performance Objectives and Instructional Modules. Muskegon, Michigan: Vocational Education Department, Muskegon Area Intermediate School District, 1976. A research and program development project conducted pursuant to a contract from the U.S. Office of Education.

4. Rich, William and Wood, Eugene. Volume I--Program Planning Guide in Agricultural Production. Carbondale, Illinois: Southern Illinois University, 1975.

5. Ross, Roger T. and Stitt, Thomas R. Volume V--Program Planning Guide in Ornamental Horticulture. Carbondale, Illinois: Southern Illinois University, 1975.

6. U.S. Department of Health, Education and Welfare, Office of Education. Career Preparation in Agricultural Production--A Curriculum Guide for High School Vocational Agriculture. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, 1974.

7. U.S. Department of Health, Education and Welfare, Office of Education. Career Preparation in Agricultural Equipment and Mechanics--A Curriculum Guide for High School Vocational Agriculture, 1974.

8. U.S. Department of Health, Education and Welfare, Office of Education. Career Preparation in Ornamental Horticulture--A Curriculum Guide for High School Vocational Agriculture, 1974.

9. Warmbrod, J. Robert. Criterion-Referenced Instruments for Assessment of Specialized Vocational Agriculture Programs--Agribusiness Supplies and Services, Agricultural Mechanics, Horticulture, and Farm Management. Columbus, Ohio: Department of Agricultural Education, The Ohio State University, 1974.

The first step used in developing student performance objectives was the identification of module titles. Each module title consisted of one or more student performance objective. Student performance objectives written by the staff outlined specifically: (1) The conditions under which the student will perform; (2) What the student will be able to do after instruction; and (3) How well the student will perform. The student performance objectives were reviewed by teachers of vocational agriculture or other agricultural experts.

Approximately eight-hundred publications were reviewed and evaluated during the study. Selected references were identified for each module title to assist teachers in teaching the student performance objectives. Each reference was identified according to the type of material (i.e. bulletin, pamphlet, filmstrip, etc.) and an AGDEX number(s). AGDEX numbers were listed to assist teachers in filing reference materials when they arrived at the local school. In this pbulication you will find student performance objectives and references for Agricultural Production. Persons interested in student performance objectives and reference materials for the instructional areas of Agricultural Mechanics and Ornamental Horticulture should write to: Agriculture and Natural Resources Education Institute, 410 Agriculture Hall, Michigan State University, East Lansing, Michigan 48824.

A Delivery System and Materials to Provide Competency-Based Education Training for Michigan Vocational Agriculture Teachers.--Objective 3 of the project stated that the staff would develop a delivery system and materials to provide Competency-Based Education Training for Michigan Vocational Agriculture Teachers. To follow are materials which have been developed:

1. Competency-Based Education Information. A document titled "Utilizing Michigan's Vocational Education Competency-Based Education Approach in Conducting Effective Vocational Agriculture Programs" has been developed. This information has been written to assist Michigan vocational agriculture teachers (those employed and those in pre-service training) in acquiring the knowledge, information, and skills needed to implement local competency-based vocational agriculture programs.
2. Manual for Determining Agricultural Employment Needs in One or More Career Education Planning Districts (CEPDs). The need to determine local employment needs is probably more urgent today than ever before. A manual has been prepared to assist vocational agriculture teachers, administrators, advisory committee members, and other individuals in determining agricultural employment needs in one or more CEPDs.
3. An Instructional Strategy for Updating What is Being Taught and to Improve Instructional Process. With rapid technological changes in the agricultural industry, teachers of vocational agriculture must update the technical content and use a variety of teaching techniques that will enhance the learning of students. A delivery system for updating the technical content and for improving the instructional process has been refined and is available for use by teachers of vocational agriculture and other educators.

Individuals interested in more information briefly mentioned under project objective number 3 should write to: Eddie A. Moore, Agriculture and Natural Resources Education Institute, 410 Agriculture Hall, Michigan State University, East Lansing, Michigan 48824.

Recommendations

1. Future curriculum development activities should evolve around the core concept with the development of instructional modules based on written student performance objectives for three instructional program areas (i.e. Agricultural Production, Agricultural Mechanics, and Ornamental Horticulture). These modules should include as a minimum the following sections:
   a. Module Concept
   b. One or More Student Performance Objective
   c. Instructional Content Areas
   d. Supporting References
   e. Instructional Resources
   f. Student Learning Activities
   g. Objective Referenced Tests
2. A delivery system to provide Competency-Based Education Training for Michigan vocational agriculture teachers should be pilot tested and implemented starting September, 1976.

Directions for Using the Appendices

Shown in Appendix A are student performance objectives for four specialty areas within the Agricultural Production area. These are consistent with and coded as defined in the Standard Terminology for Curriculum and Instruction in Local and State School Systems. The overall area of Agricultural Production is given the designation 01.01 00. The specialty areas have the following designations:

Animal Science	01.01 01
Plant Science	01.01 02
Farm Mechanics	01.01 03
Farm Business Management	01.01 04

In Appendix B, you will note that references have been identified for module titles in each specialty area. Appendix C indicates where references might be ordered. The sample format and information on pages 8 to 12 explains how the Appendices should be used.

Explanation of the Format.--As shown by Circle 1, the USOE vocational agriculture program area is Ornamental Horticulture. The specialty area shown in parenthesis is "Landscape Establishment and Maintenance". Circle 2 depicts the USOE code number for this specialty area. Shown with Circle 3 is the module title which should be covered by the instructor. As shown by Circle 4, student performance objectives for this module title were written in measurable terms. After reviewing the performance objectives, the teacher is given information relative to where references are listed in the document (see Circle 5). By going directly to the page specified, the teacher is able to see the type of up-to-date references which are available

(see Circle 6). In order to assist vocational agriculture teachers in the filing of agricultural publications a system (AGDEX) for classifying, indexing, and filing has been developed. Many vocational agriculture teachers in the state are presently using the AGDEX system for filing agricultural publications. New teachers are encouraged to use this unique filing system. Circle 7 shows that each reference has a set of one or more AGDEX numbers. In observing reference number "6" on page 11, you will note that there is a set of three numbers (275). This set of numbers represent a broad area (Ornamental and Shade Trees) in the AGDEX filing system. Reference number "1" illustrates two sets (275/22) of numbers. The first set of numbers (275) represent the broad area and the second set of numbers (22) represent a sub-topic area under the broad area. Reference number "3" has two sets of three digit numbers (641/550). In essence, if enough copies of this reference (reference number three) are available, the teacher could file this document under two broad areas.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

(1) **Program Area:** Ornamental Horticulture (Landscape Establishment and Maintenance) (2) USOE Code Number: 01.05 04

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
(3) PLANTING LANDSCAPE PLANTS AND TREES (5) References are on page 4.	(4) 1. Given a landscape plan, various types of plants which are bareroot, balled and burlapped, plus the necessary tools for transplanting,	the student will transplant various types of plants,	according to recommendations of the Cooperative Extension Service and/or teacher of vocational agriculture so that the plants are able to grow at their maximum.
	2. Given trees needing protection from winter winds and temperatures and provided with wrapping material, string, wire, and stakes,	the student will properly wrap and stake the trees,	so that the trees are anchored in an upright position and the soil remains firm to prevent drying of the roots.
	3. Provided with plants and trees, a choice of mulching material and sufficient hand tools,	the student will apply a mulch to the plants and trees,	so well that the weeds are controlled, the moisture maintained and the appearance enhanced.

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MODULE TITLE	REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
PLANTING LANDSCAPE PLANTS AND TREES	1. Koelling, Melvin R., Extension Bulletin E-771--Tree Planting in Michigan. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1973. (MI/3)	Bulletin	275/22
	2. Transplanting Shade Trees--VAS 5002. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2)	Pamphlet	275/22
	3. Mulches. Brooklyn, New York: Brooklyn Botanic Garden. (NY/3)	Pamphlet	641/550
	4. Brooks, William M., Utzinger, J.D., and Tayama, Harry K., Extension Bulletin 526--Mulches for the Home Grounds. Columbus, Ohio: Cooperative Extension Service, The Ohio State University. (OH/3)	Bulletin	641/550
	5. Tree and Shrub Forms--Their Landscape Use. Brooklyn, New York: Brooklyn Botanic Garden. (NY/3)	Pamphlet	272/17
	6. Baumgardt, John P., How to Care for Shade and Ornamental Trees. Kansas City, Missouri: Intertec Publishing Corporation, 1974. (MN/1)	Book	275
	7. USDA Home and Garden Bulletin 192--Transplanting Ornamental Trees and Shrubs. Washington, D.C.: Superintendent Of Documents for the U.S. Government Printing Office. (DC/1) (8)	Bulletin	275/22
	8. Williams. L. and Herner, R.C., Using Mulches Around the Home (HM-9). East Lansing, Michigan: Horticulture Department, Michigan State University, 1974.	Bulletin	641/550
	9. Planting Ornamental Trees and Shrubs. Lafayette, Indiana: Audio-Visual Productions of Purdue University.	Slide Set	275/22

SAMPLE

KEY TO SOURCES

CODE	STATE	SOURCE AND ADDRESS
DC/1	District of Columbia	Superintendent of Documents U.S. Government Printing Office Washington, D.C. 20402
IL/2	Illinois	Vocational Agriculture Service 434 Mumford Hall University of Illinois Urbana, Illinois 61801
MI/1	Michigan	Agriculture and Natural Resources Education Institute 410 Agriculture Hall Michigan State University East Lansing, Michigan 48824
MI/3	Michigan	MSU Bulletin Office P.O. Box 231 East Lansing, Michigan 48824
MN/1	Minnesota	Hobar Publication 1305 Tiller Lane St. Paul, Minnesota 55112
NY/3	New York	Brookyln Botanic Garden 1000 Washington Avenue Brooklyn, New York 11225
OH/3	Ohio	Extension Bulletin Office The Ohio State University Columbus, Ohio 43210

APPENDIX A

Student Performance Objectives for Teaching Agricultural Production

AGRICULTURE AND NATURAL RESOURCES EDUCATION INSTITUTE

VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
SELECTING LIVESTOCK OR POULTRY FOR THE FARM References are on page 137	1. Given access to a farm adapted for livestock or poultry together with the list of appropriate crops to be grown,	the student will recommend the type of livestock or birds to be raised on the farm,	the recommendations of the student will be within the range of acceptable types of livestock or birds, recommended for the farm by the Cooperative Extension Service or a jury of 3-5 successful farm operators in the area.
	2. Given access to a farm adapted to specific types of livestock or poultry which are to be raised on the farm,	the student will recommend the specific breeds for the farm,	the recommendations of the student will be within the range of acceptable breeds recommended by the Cooperative Extension Service or a jury of 3-5 successful farm operators in the area.
	3. Given access to a farm adapted to a specific breed of livestock,	the student will study production levels, performance records and pedigrees of the specified breed and recommend a range production within which breeding or feeder stock should be selected,	the recommendations of the student will be within the range of acceptable production levels recommended by the Cooperative Extension Service or by a jury of 3-5 successful farm operators in the area.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
SELECTING LIVESTOCK OR POULTRY HOUSING References are on page 138	1. Given the number and type of livestock or poultry for a proposed production program, references, livestock or poultry buildings,	the student will: a. determine housing needs of livestock or poultry b. assess available livestock or poultry housing c. recommend a type and size of building d. select the most desirable location and number of buildings needed to provide economic housing,	according to information and recommendations of the Co-operative Extension Service or some other approved source.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
SELECTING BREEDING MATES References are on page 139	1. For a given breeding female and using pedigrees and production records,	the student will select a male to mate with that female to increase the probability of a superior offspring,	the selection should be in accordance with those recommend by a breeders association.
	2. Given access to animals of breeding age,	the student will cull those animals which do not measure up with the selection standards,	as set forth by past and present breeding records of animals performance.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) **USOE Code Number:** 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
MANAGING MALE BREEDING ANIMALS References are on page 139	1. Given a diagram of the male's reproductive tract for a certain species of livestock,	the student will identify and explain the functions of each part,	95% of the parts should be identified and explained in regard to their functions according to a standard reference supplied by the teacher.
	2. Given access to a breeding male of a certain species and farm buildings,	the student will select and prepare housing for the animal,	according to recommendations of the Cooperative Extension Service or other individuals in order to insure adequate protection.
	3. Given a breeding male of a certain animal species, feeds and other facilities for caring for the animal,	the student will: a. balance a ration for the animal b. feed the animal c. water the animal d. select and prepare an area(s) for breeding e. prepare the male animal for breeding if necessary,	according to information received from the Cooperative Extension Service and the tasks are performed to the satisfaction of the instructor.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
HOUSING AND SANITATION FOR LIVESTOCK OR POULTRY References are on page 140	1. Given a specific housing situation for the type of livestock or poultry being studied,	the student will demonstrate: a. control of temperature for the livestock or poultry b. control of ventilation at optimum level for the livestock or poultry c. control of humidity at optimum level for the livestock or poultry,	the controls demonstrated by the student will be in 95% or better conformity with standards recommended by the Cooperative Extension Service as determined by the instructor.
	2. Given a specific housing situation for the type of livestock or poultry being studied,	the student will demonstrate cleaning and sanitizing the housing area (building and yards) to minimize spread of disease in the herd or flocks,	the cleaning and sanitizing process will be in 95% conformity with the recommedations of a veterinarian selected by the instructor.
	3. Given a specific housing situation for the type of livestock or poultry being studied,	the student will outline in writing a plan for handling feed and feeding equipment which will minimize spread of disease through contaminated feed,	the written plan will be in conformity with recommendations of the Cooperative Extension Service as determined by the instructor.

AGRICULTURE AND NATURAL RESOURCES EDUCATION INSTITUTE

VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) **USOE Code Number:** 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PREPARING THE FEMALE FOR BREEDING References are on page 140	1. Given access to the animals found on the farm,	the student will: a. describe verbally or in writing the procedures to "flush" these animals to assure that they are in good breeding condition physically and physiologically, b. prepare these animals for breeding in a way which will prevent disease transmission c. prepare these animals for breeding in a way which will prevent injury to both the male and female,	according to the opinion and recommendations of the local veterinarian or breeding specialist.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) **USOE Code Number:** 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
DETECTING PROPER TIME FOR BREEDING References are on page 141	1. For each type of livestock commonly produced in the local area,	the student will: a. use the appropriate procedures in determining whether a given type female livestock is in heat, b. describe verbally or in writing when each type of female livestock should be bred during the estrus period c. describe verbally or in writing the length and reoccurrence of estrus for each female species of livestock,	according to the perception of a breeding specialist and/or an approved reference document supplied by the instructor.
	2. Given access to a diagram, photograph or specimen of a female livestock,	the student will: a. identify the different organs that comprise the female reproductive tract and explain the major functions of each b. describe verbally or in writing the estrus cycle and its relationship to the onset of estrus in normally functioning females c. identify the major hormones that regulate the estrus cycle and state their origin and function in a normally functioning female	with 95% accuracy in identification and explanation according to a standard reference supplied by the teacher.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) **USOE Code Number:** 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
BREEDING LIVESTOCK ARTIFICALLY References are on page 141	1. For a given species of livestock,	the student will explain verbally or in writing advantages and disadvantages of the use of sires by artifical insemination compared to the use of sires by natural mating on the following items: a. cost of owning a sire versus purchasing semen b. genetic improvement c. safety and disease control d. labor involved and convenience e. facilities f. failure in heat detection g. conception results h. breed association registration requirements of offspring,	according to recent studies on the student and opinion of the Cooperative Extension Service personnel and/or teacher of vocational agriculture.
	2. Given information regarding the production performance, physical traits, and characteristics needing improvement for a specific herd or flock,	the student will select the sire(s) most desirable for achieving improvement in the herd or flock,	based on given production performance records and type characteristics of available sires.
	3. Given access to females mature enough for breeding,	the student will: a. determine the best time for inseminating b. contact the inseminator at the appropriate time, c. prepare the animal for breeding,	according to approved artifical breeding practices in order to insure maximum level of conception.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
THE DEVELOPING FETUS References are on page 142	1. Given access to information regarding a pregnant female of a certain farm animal species,	the student will: a. describe the path the developing embryo takes in the reproductive tract and where it locates permanently to insure normal development b. describe the development stages of the offspring from fertilization up to delivery c. describe the method by which the developing offspring is nourished and how removal of waste materials is accomplished to insure normal development d. determine the expected length of the gestation period necessary for normal development,	with 95% accuracy in the responses as depicted in approved reference materials and to the satisfaction of the instructor.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) **USOE Code Number:** 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
CARING FOR FEMALE LIVESTOCK DURING GESTATION References are on page 143	1. Given access to female livestock which are in the gestation period and several types of farm buildings,	the student will select and prepare shelter for the female livestock,	according to recommendations of the Cooperative Extension Service and/or other individuals in order to insure adequate protection during inclement weather or other adverse conditions.
	2. Given access to female livestock which are in the gestation period, feeds and other facilities for caring for the animals,	the student will: a. balance a ration for the female animals b. feed the animals c. water the animals d. demonstrate the ability to care and manage the gestation period of female animals,	according to care and management practices provided by the Cooperative Extension Service or some other source.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) **USOE Code Number:** 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
CARE AND MANAGEMENT OF FEMALE LIVESTOCK AND OFFSPRING DURING LABOR References are on page 144	1. Given access to female livestock of a certain species in the latter stages of gestation,	the student will: a. identify those animals which are about to give birth b. prepare the animals and facilities for giving birth,	according to information provided by the Cooperative Extension Service or some other reference and to the satisfaction of the instructor.
	2. Given access to female livestock of a certain species which are ready to deliver,	the student will: a. provide special assistance if needed by the female before, during, or after delivery b. care for offspring immediately following birth,	according to practices recommended by the Cooperative Extension Service and to the satisfaction of the instructor so that both the health of the female and offspring are in good condition.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
REBREEDING LIVESTOCK References are on page 144	1. Given access to female livestock of a certain animal species that has just given birth,	the student will: a. identify the first sign the animal comes into heat b. plan the best time for rebreeding the animal c. explain the best method to use in bringing animals in heat d. explain the procedures to use in increasing the chances of getting problem breeders pregnant,	according to recommendations, procedures, and other pertinent information received from the Cooperative Extension Service and/or the local veterinarian.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
DETERMINING LIVESTOCK OR POULTRY NUTRITIVE REQUIREMENTS References are on page 145	1. Given information in regard to a specific type of livestock such as known weight, sex, and productive purpose,	the student will list and explain the nutrient requirements of that livestock,	according to the Cooperative Extension Service or similar reference.
	2. Given information relative to a specific type of poultry,	the student will list and explain the nutrient requirements of the poultry,	according to recommendations of the Cooperative Extension Service or a similar reference.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
THE FOOD NUTRIENT GROUPS AND THEIR FUNCTIONS IN THE BODIES OF LIVESTOCK OR POULTRY References are on page 146	1. After receiving instruction from the vocational agricultural teacher on the functions of six basic food nutrients in livestock or poultry,	the student will explain verbally or in writing the functions of the nutrients in the bodies of livestock or poultry,	two major functions of each food nutrient should be explained as described in a reference of standards such as those of the National Academy of Sciences or some other approved reference.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
THE DIGESTATION, ABSORPTION, AND METABOLISM OF FOOD IN LIVESTOCK OR POULTRY References are on page 146	1. Given references, diagrams, access to various types of farm animals,	the student will: a. identify ruminant and non-ruminant animals b. use a diagram of the monogastive digestive system in identifying and explaining the function of each part,	as defined by a student reference and to the satisfaction of the instructor.
	2. Given one of the food nutrients and diagrams,	the student will explain the process that nutrient will go through during digestion, absorption and metabolism in the animal's body,	as depicted in an approved reference and to the satisfaction of the instructor.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
SELECTING FEEDS ACCORDING TO THEIR NUTRITIVE VALUES References are on page 146	1. Given a list of feeds containing one or more of the commonly used feedstuffs, a feed composition table, and other appropriate references,	the student will: a. explain orally or in writing six common terms used in feedstuff composition tables b. identify five abbreviations used in feedstuff composition tables c. explain how much feed composition table information on a particular feed is needed in order to balance a ration correctly d. determine the nutritive value of several feeds commonly used in rations,	according to given feed composition table, other approved reference and 95% accuracy in determining nutritive values.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) **USOE Code Number:** 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
BALANCING RATIONS FOR FARM ANIMALS References are on page 147	1. Given access to a specific class of livestock or poultry, a list of locally available feeds (both home-grown and commercial) together with the market price of each feed,	the student will: a. compute the nutrient requirements of the specified livestock or poultry and identify least-cost sources of each kind of nutrient appropriate for the class of animal b. select the least-cost feeds, minerals, and vitamins suitable for feeding the specified livestock and poultry c. specify the amounts of each ingredient needed to supply the least-cost nutrient requirements for the specified animals for 24 hours d. specify necessary mineral and vitamin supplements needed to provide requirements of the specified animals,	the selections and recommendations of the student will be in 95% or better agreement with similar specifications of the Cooperative Extension personnel in the area, using the same cost data, as determined by the instructor.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
FEEDING FARM ANIMALS IN VARIOUS TYPES OF OPERATIONS References are on page 147	1. Given a newborn of any species of livestock found on the home farm, feed and other commodities needed to assist newborn animals in obtaining a healthy start,	the student will: a. follow practices to assure that the newborn nurses properly and has proper food and water available b. prepare feeds for newborn,	according to recommendations of the Cooperative Extension Service so that the newborn receives a healthy start.
	2. Given certain species of young and growing livestock, access to farm buildings, feeds, building materials, pastures,	the student will: a. prepare plans for constructing a creep feeder b. construct a creep feeder c. formulate creep rations d. design a plan for feeding mature livestock e. use pasture feeding procedures to feed livestock f. manually feed the livestock g. mechanically feed the livestock,	according to recommendations of the Cooperative Extension Service so that maximum economical gains of the livestock can be obtained.
	3. For a given group of finishing livestock found on the home farm, farm buildings, and facilities, feeds,	the student will: a. design a plan for finishing the livestock b. prepare feeds for finishing livestock c. operate hand feeding, automatic feeding, self-feeding and other types of feeding systems to feed animals d. operate various types of watering systems,	according to recommendations of the Cooperative Extension Service so that maximum economical gains of the livestock can be obtained.

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Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
IDENTIFYING AND SOLVING PROBLEMS RELATED TO NUTRITION References are on page 147	1. Using livestock or visual materials,	the student will: a. identify problems caused by a lack of clean fresh water and recommend methods to provide an adequate quantity and quality of water b. identify problems caused by insufficient protein and recommend methods of preventing protein deficiency c. identify problems caused by too much urea used in the ration and recommend a method to insure that the livestock will not be affected, d. identify problems caused by a lack of carbohydrates provided in the ration and recommend a method to insure that the animals will not be affected e. identify problems caused by inferior quantity and quality of the total ration and recommend a method to insure the animal will not be affected.	95% of the problems should be identified and the recommendations should be similar to those of the Cooperative Extension Service.

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Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
STORING AND HANDLING LIVESTOCK FEEDS References are on page 148	1. Given access to hay or other similar roughages and equipment for handling and storing,	the student will: a. manually and mechanically handle and store hay or other similar roughages,	according to recommendations of the Cooperative Extension Service in order to insure minimum nutrient losses due to spoilage and waste.
	2. Given access to silage used on the farm and equipment for handling and storing,	the student will: a. mechanically handle and store silage b. determine the quality of silage after storing,	according to recommendations and procedures of the Cooperative Extension Service to insure minimum nutrient losses due to spoilage and waste.
	3. Given access to home-grown grains and machinery for handling and storing,	the student will: a. mechanically handle and store grain b. aerate and dry store grain,	according to recommendations of the Cooperative Extension Service to insure minimum nutrient losses or spoilage and waste due to rodents, disease, and other parasites.
	4. Given access to commercial feeds supplements, and feed additives and machinery for handling and storing,	the student will handle and store the commercial commodities,	according to recommendations of the Cooperative Extension Service in order to minimize product losses due to spoilage and waste caused by rodents, diseases, parasites and improper use and storage techniques.

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Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PREVENTING, DETECTING, AND CONTROLLING COMMON LIVESTOCK DISEASES References are on page 149	1. Given access to various livestock, farm facilities and materials needed to prevent livestock diseases,	the student will: a. prepare a livestock disease prevention program b. conduct a livestock disease prevention program,	according to recommendations of the Cooperative Extension Service and other appropriate sources.
	2. Given various livestock animals common to the local area infected with common diseases and recognized reference which describes sympton and treatment for livestock disease,	the student will: a. identify the disease causing damage b. recommend treatment c. determine whether technical or professional assistance is needed to carry out recommended control procedures d. treat and control livestock disease,	according to recommendations of the Cooperative Extension Service and directions on the container for treatment so that the disease is controlled or eliminated in a given herd or livestock.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PREVENTING, DETECTING, AND CONTROLLING LIVESTOCK PARASITES References are on page 150	1. Given access to various livestock, farm facilities, and materials needed to prevent livestock parasites,	the student will: a. prepare a program for preventing the infestation of parasites b. conduct a parasite prevention program,	according to recommendations of the Cooperative Extension Service or some other sources.
	2. Given various livestock animals common to the local area infested with common parasites, reference,	the student will: a. identify the parasites causing the damage b. recommend treatment c. determine whether technical or professional assistance is needed to carry out recommended control procedures d. treat and control livestock parasites,	according to recommendations of the Cooperative Extension Service and directions on the containers for treatment so that the parasites are controlled or eliminated.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
DETECTING AND CONTROLLING ANIMAL HEALTH DISORDERS DUE TO POISONOUS PLANTS References are on page 151	1. Given access to farm animals that have ingested poisonous plants or a simulation exercise prepared by the instructor and references,	the student will: a. recognize signs of plant poisoning in livestock b. recommend actions to be carried out due to the illness c. explain and/or demonstrate how the animals should be cared for until professional assistance arrives,	according to information obtained from the Cooperative Extension Service. The explanations and/or demonstrations should meet the approval of the instructor or some other designated person.
	2. Given information regarding poisonous plants which are common to the area, livestock,	the student will: a. identify poisonous plants common to the area b. explain practices which should be carried out to prevent and control poisonous plants,	95% of the plants should be identified by their common names and the prevention and control practices should be those recommended by the Cooperative Extension Service.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
DETERMINING THE MOST FEASIBLE TIME TO MARKET LIVESTOCK References are on page 152	1. Given supply and demand schedules, number of livestock to be sold, market reports for a three year period,	the student will: a. determine the price and total return expected by constructing supply/demand curves b. determine the cycles pattern for prices and the most feasible time for marketing the livestock,	according to information received from the Cooperative Extension Service and instructor of vocational agriculture.

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Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
DETERMINING MARKET CLASSES AND GRADES OF LIVESTOCK References are on page 152	1. Given access to a group of livestock of varying ages, general uses, sex, and weight,	the student will determine the market classes and grades of the livestock,	according to an approved reference supplied by the teacher of vocational agriculture.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
SELECTING APPROPRIATE LIVESTOCK MARKETING METHODS References are on page 152	1. Given a list of available markets in the local area and a number of animals to be marketed,	the student will select the most appropriate method (e.g. selling on basis of carcass grade and weight, action markets, etc.) for marketing the animals,	according to the recommendations of the Cooperative Extension Service and/or a jury of 3-5 recognized farmers in the area.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PREPARING AND HANDLING LIVESTOCK FOR MARKETING References are on page 153	1. Given access to livestock, livestock buildings, and facilities, feeds, vehicles used to transport livestock,	the student will: a. feed and water livestock before shipment b. select the most appropriate method for transporting livestock to market c. load livestock on transportation vehicle,	according to recommendations of the Cooperative Extension Service and/or teacher of vocational agriculture in order to market animals at the least cost without body injuries and/or death losses.

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Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
MARKETING RAW MILK References are on page 153	1. Given the amount of raw milk to be sold, butterfat percentage, current price information, grade, and other information,	the student will: a. determine the expected return for the amount to be sold b. explain how raw milk prices are determined before marketing,	with 95% accuracy in determining expected return for the amount sold and that the explanation meets the approval of the instructor.

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Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
MARKETING POULTRY AND EGGS References are on page 154	1. Given access to poultry and eggs, poultry buildings, feeds, vehicles used to transport poultry products,	the student will: a. feed and water poultry before shipping b. select the most appropriate method for transporting poultry and eggs c. load poultry and eggs on transportation vehicle,	according to recommendations of the Cooperative Extension Service and/or buyer in order to market products in an efficient and safe manner.
	2. Given access to a group of poultry and eggs,	the student will: a. determine market classes and grade poultry b. grade eggs,	according to an approved reference supplied by the teacher of vocational agriculture or some other source.

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Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
CASTRATING, DEHORNING, IDENTIFYING, AND INJECTING LIVESTOCK References are on page 154	1. Given a specific breed of livestock or poultry at the appropriate age,	the student will castrate* a specified number of animals,	the operation will be performed in conformity with the practices specified by a person designated by the instructor.
	2. Given dairy or beef animals at the appropriate age,	the student will dehorn a specified number of animals using: a. caustic on calves b. dehorning equipment on older animals,	the dehorning operation will be done in conformity with the specifications of a person designated by the instructor.
	3. Given access to livestock and various types of identification equipment,	the student will apply the most appropriate means of identification of that animal (e.g. branding, ear marking),	according to recommendations of the Cooperative Extension Service and/or teacher of vocational agriculture or some other designated person.
	4. Given a specific breed of livestock or poultry,	the student will: a. determine the identification requirements for registration in the breeders association,	marking will be in conformity with the breeders association requirements as determined by the owner of the animals or birds.
	5. Given access to livestock and an approved injection device and biological products,	the student will inject animals with appropriate drug(s),	according to recommendations of the veterinarian or some other designated person.

*In areas where it is illegal for lay persons to castrate specified types of animals, the students and teacher will not practice on these animals.

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Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
DOCKING, SHEARING, TRIMMING FEET, AND WORMING SHEEP	1. Given a young lamb, 1-2 weeks old and docking tool,	the student will remove the tail (dock) from the animal,	according to recommendations of the Cooperative Extension Service or the local veterinan
References are on page 154	2. Given a wooled sheep, electric shears and trimming equipment,	the student will: a. shear the sheep b. trim the animal's feet,	as illustrated by the Sunbeam Corporation or similar procedures for shearing and that the the trimming of animals feet meet the approval of the teacher of vocational agriculture.
	3. Given a young or mature sheep which needs worming and equipment for worming,	the student will worm the animal,	as recommended by the manufacturer of dosage without injuring the animal.

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Program Area: Agricultural Production (Animal Science)

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PREPARING FOR SHOW AND SHOWING LIVESTOCK References are on page 155	1. Given an animal of a certain species and the proper equipment,	the student will prepare that animal for show,	in a manner which will maximize its desirable characteristics and minimize its undesirable characteristics according to the type of standards set up by the livestock industry or some other approved reference.
	2. Given an animal of a certain species that has been prepared for show,	the student will show that animal to its best advantage,	according to the customs and standards established by the livestock industry or some other approved reference.

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Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
MILKING COWS References are on page 156	1. Given access to equipment used in milking of dairy cows, a lactating dairy animal,	the student will: a. assemble and sanitize milking equipment, b. clean milking area c. prepare udder and teat for milking d. disinfect the teat cup e. place the milking machine on the cow f. strip the cow,	according to procedures and techniques recommended by the Cooperative Extension Service or some other approved source.
	2. Given access to milking units (pipeline system, empty bulk tank), cleaning and sanitizing items,	the student will clean and sanitize the milking units,	according to directions specified by the manufacturer of the cleaning and sanitizing agents.

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Program Area: Agricultural Production (Animal Science) USOE Code Number: 01.01 01

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
DISPOSE OF CROP AND ANIMAL WASTES TO PROTECT THE ENVIRONMENT	1. Given a quantity of crop residues,	the student will outline in writing a system of disposal which will minimize damage to the environment,	based on standards established by the instructor or designated person.
References are on page 156	2. Given the crop fertilization plan of a farm of the type the student is studying,	the student will outline in writing a program to minimize damage to the environment,	based on standards established by the instructor or a designated person.
	3. Given the pesticide control program of a farm of the type the student is studying,	the student will outline in writing a program to minimize damage to the environment from the chemical,	based on standards established by the instructor or a designated person.
	4. Given the livestock and poultry program of a farm of the type the student is studying,	the student will outline in writing a program to minimize damage to the environment from the animal or poultry wastes,	based on standards established by the instructor or a designated person.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Plant Science) USOE Code Number: 01.01 02

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PLANNING THE CROPPING PROGRAM References are on page 157	1. Given access to a specified number of land areas in the school community,	the student will recommend cropping programs for each area based on his verbal or written analysis of each of the following factors: a. climatic conditions b. soil conditions c. governmental programs d. physical conditions of the farm e. the need for forage and grain in the area f. the yield of crops on farms in the area g. selection of crop species and varieties suitable to the cropping program of a given farm on the basis of climate, soil and physical farm conditions h. inputs required for the production of a crop and possible returns,	which will be in line with the land use capability as determined by the Soil Conservation Service or the Cooperative Extension personnel of the area and teacher of vocational agriculture.
	2. Given access to the same land areas as mentioned is student Objective 1,	the student will list one or more types of farming,	which the recommended cropping program (P.O. 1) would support. The recommendations will be within 95% conformity with those of the Soil Conservation personnel in the area.

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Program Area: Agricultural Production (Plant Science) USOE Code Number: 01.01 02

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
SELECTING A TILLAGE SYSTEM FOR SEED GERMINATION AND PLANT GROWTH References are on page 157	1. Given access to an area with a soil type and condition and crop seeds to be grown,	the student will select an appropriate tillage practice,	according to recommendations of the Cooperative Extension Service in order to prevent soil compaction, pest problems, and 90% or more germination of viable seeds.

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Program Area: Agricultural Production (Plant Science) USOE Code Number: 01.01 02

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
OPERATING, ADJUSTING, SERVICING, AND STORING FARM TILLAGE EQUIPMENT References are on page 157	1. Given a specified number of land areas in the school community and approved cropping program for each area,	the student will: a. recommend a tillage program which will minimize erosion b. encourage optimum growth of crops c. produce optimum yields d. minimize tillage costs,	the recommendations of the student will be in 95% or better conformity with the recommendations of the Soil Conservation Service personnel in the area and/or the teacher of vocational agriculture.
	2. Given information concerning the number of acres and type of soil to be prepared for planting,	the student will: a. select the appropriate farm tractor and tillage machinery for the task to be completed b. attach tillage machinery to farm tractor c. safely operate the farm tractor in preparing the soil for planting d. adjust the tillage machinery for maximum efficiency,	so that the tillage operation is rated acceptable by a jury of 3-5 successful farm operators in the community and/or teacher of vocational agriculture.
	3. Given access to a farm tractor and tillage equipment that has been used in preparing the soil for planting,	the student will: a. clean the farm tractor and tillage machinery b. lubricate and service the farm tractor and tillage machinery c. properly store the farm tractor and tillage machinery,	by following recommendations in given service manuals and to the satisfaction of the farm operator or designated person.

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Program Area: Agricultural Production (Plant Science) USOE Code Number: 01.01 02

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
DETERMINING FERTILITY NEEDS FOR FARM CROPS References are on page 158	1. Given a specified area of soil, appropriate equipment and a specific crop to be grown,	the student will: a. collect representative soil samples b. prepare soil samples for testing and submit the samples to the appropriate agency for testing c. use a soil test report from the soil laboratory, calculate the nutrients available in the soil and determine the amounts and kinds of lime and/or fertilizer needed to achieve maximum returns, d. calculate the cost of acquiring the needed kinds and amounts of lime and fertilizer for a given field,	in conformity with recommendations of the local Cooperative Extension personnel, and with 95% accuracy in the mathematical calculations as determined by the instructor.
	2. Given the responsibility of determining nutrient deficiency in plants,	the student will: a. collect and test plant tissues b. interpret the results from the plant tissue testing report and recommend the kind and amounts of additional nutrients required to correct the deficiency,	according to recommendations by the teacher, county Cooperative Extension agent, or personnel of the soil testing laboratory.

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Program Area: Agricultural Production (Plant Science) USOE Code Number: 01.01 02

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
DETERMINING FERTILITY NEEDS FOR FARM CROPS	3. Given the per acre amount (pounds) of crop residue returned to the soil,	the student will calculate the nutrients supplied by crop residue,	based on recent agronomy data for crop residue fertility with 95% accuracy and tc the satisfaction of the instructor.
	4. Given the appropriate information regarding amount and kind of manure applied of a field,	the student will calculate the nutrients applied to the field,	according to published data on livestock waste fertility with 95% accuracy and to the satisfaction of the instructor.
	5. Given information pertinent to the yield goal of a crop to be grown, the amount and kind of nutrients supplied by the soil, manure, and crop residue,	the student will determine the amount and kind of additional nutrients needed to reach the yield goal,	based on crop residue and livestock waste fertility data with 95% accuracy and to the satisfaction of the instructor.

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Program Area: Agricultural Production (Plant Science) USOE Code Number: 01.01 02

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
DETERMINING pH LEVEL AND LIMING NEEDS FOR CROPS TO BE GROWN References are on page 159	1. Given one or more land areas together with the results of soil tests, including the pH level, and the crops to be grown,	the student will recommend the amount of liming material needed to bring the pH level to the optimum range for the crop,	the recommendation of the student will be in 95% conformity with the recommendation of the Cooperative Extension Service and/or teacher of vocational agriculture.
	2. Given appropriate equipment and liming material,	the student will adjust and calibrate the equipment and apply the lime,	within 95% of the application rate which was specified in Objective 1.

AGRICULTURE AND NATURAL RESOURCES EDUCATION INSTITUTE

VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Plant Science) USOE Code Number: 01.01 02

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
SELECTING LIME AND FERTILIZER FOR AGRICULTURAL CROPS References are on page 159	1. Given a specified number of land areas in the school community together with Soil Test reports,	the student will recommend fertilizer and liming programs appropriate for the recommended cropping program for each area,	the recommendations of the student will be 95% or better in conformity with similiar recommendations of the Cooperative Extension Service and/or a jury of 3-5 succsss-ful farm opreators of the community.
	2. Given information regarding the chemical compounds of lime and of fertilizer materials,	the student will convert the oxide pounds to element pounds of nutrients or lime to determine the amount of nutrients supplied,	with the degree of accuracy previously established by the instructor.
	3. Given information relative to the fertility and pH needs of a crop above those supplied from the soil, manure, and crop residues,	the student will determine the amount, grade, and ratio of the fertilizer material and the amount of calcium required,	to produce an optimum yield based on the lowest cost per unit of the fertilizer and lime, as recommended by the Cooperative Extension Farm Management Specialists for similiar farms in the area.
	4. Given information pertinent to the sources of lime or fertilizer materials,	the student will define the major characteristics of each source in terms of chemical reactions, such as availability, leaching or volatilization, effect on soil pH toxicity to plants, physical form and cost for a crop and soil type,	to the satisfaction of the instructor based on agronomic recommendations.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Plant Science) USOE Code Number: 01.01 02

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
SELECTING LIME AND FERTILIZER FOR AGRICULTURAL CROPS	5. Given the appropriate information regarding the amount, grade, and ratio of fertilizer material for production of a specified crop,	the student will determine the supply source of the materials,	based on convenience, economy, and availability with accuracy and completeness and to the satisfaction of the instructor.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Plant Science) USOE Code Number: 01.01 02

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
OPERATING, ADJUSTING, SERVICING, AND STORING FARM FERTILIZER APPLICATION EQUIPMENT References are on page 160	1. Given the number of acres and type of soil to be fertilized,	the student will: a. select the appropriate farm tractor and fertilizer applicator by considering the job to be performed b. attach fertilizer applicator to farm tractor c. safely fill the applicator with fertilizer d. safely operate the farm tractor in applying fertilizer e. adjust the applicator for maximum efficiency,	so that the fertilizer operation will meet the standards of the farm operator on whose farm the operation is carried out.
	2. Given access to a farm tractor and fertilizer applicator that has been used in applying fertilizer,	the student will: a. clean the farm tractor and fertilizer applicator b. lubricate and service the farm tractor and the fertilizer applicator c. properly store the farm tractor and fertilizer applicator,	by following recommendations in given service manual and to the satisfaction of the farm operator or a designated person.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Plant Science) USOE Code Number: 01.01 02

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
OPERATING, ADJUSTING, SERVICING, AND STORING FARM PLANTING EQUIPMENT References are on page 160	1. Given an area of land in the school community, which is adapted to supporting the type of farming the student is studying,	the student will recommend the variety, or varieties, of each crop to be included in the cropping program for the land area,	all varieties recommended by the student will be among those recommended by the Cooperative Extension Service (or the purchaser of the crops if they are contracted).
	2. Given information regarding the number of acres and type of soil to be planted,	the student will: a. select the appropriate size farm tractor and planting equipment according to the job to be performed b. attach the planting equipment to the farm tractor c. adjust the planting equipment when planting seeds of different sizes d. safely operate the farm tractor in planting seeds,	so that the planting operation will meet the approval of the farm operator on whose farm the operation is being carried out.
	3. Given access to a farm tractor and planting equipment to be stored after planting seeds,	the student will: a. clean the farm tractor and planting equipment b. lubricate and service the farm tractor and planting equipment c. properly store the farm tractor and planter,	by following recommendations in given service manuals and to the satisfaction of the farm operator or a designated person.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Plant Science) USOE Code Number: 01.01 02

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PREPARING A WEED CONTROL PROGRAM IN GROWING CROPS References are on page 161	1. Given an area of land to be planted to a specified crop,	the student will outline in writing a plan for weed control for the season including listing methods to control weeds through: a. seed selection b. cultivation c. use of herbicides,	which will be in conformity with the recommendations of the Cooperative Extension Service and/or teacher of vocational agriculture for each crop.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Plant Science) USOE Code Number: 01.01 02

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
DETERMINING THE EFFECTS OF FERTILIZER CHEMICALS ON THE ECOLOGY References are on page 161	1. Given the plans for fertilizing a field (kind and amount),	the student will: a. determine the effects on the environment due to soil and water pollution as a result of fertilizer application b. determine the effects on livestock and man as a result of toxic conditions (systemic) which may occur in plants,	in accordance with regulations of the Environmental Protection Agency.
	2. Given the appropriate equipment and the task of testing water samples on or near a farm where a variety of fertilizer farm practices are being conducted,	the student will select and use the equipment (Hash or Delta Kit) to collect and test water samples for nitrate and nitrite levels,	in such a way that the results are 95% accurate.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
OPERATING, ADJUSTING, SERVICING, AND STORING FARM CULTIVATION EQUIPMENT	1. Given access to a farm tractor with specific cultivating equipment,	the student will safely and efficiently operate the farm tractor with the cultivating equipment to cultivate the soil,	according to the operator's manual and so that the cultivation operation will assist in producing an optimum yield as determined by the instructor.
References are on page 162	2. Given the task of diagnosing malfunctions of the tractor and/or cultivating equipment and of making adjustments on farm cultivating equipment while in the field,	the student will select and use the appropriate tools to diagnose and make necessary adjustments on the farm equipment,	so well that the equipment will operate safely and efficiently.
	3. Given the appropriate farm cultivating equipment,	the student will prepare the machinery for storage using appropriate tools,	by following recommendations in the service manual for the machine so that the equipment will operate safely and efficiently when used to cultivate the soil.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Plant Science) USOE Code Number: 01.01 02

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PREPARING AN INSECT AND DISEASE CONTROL PROGRAM FOR GROWING CROPS	1. Given a specific crop, or group of crops for observation and access to reports of the Cooperative Extension Service on build-up of insects and diseases,	the student will predict mild, moderate, or severe build-up of specific insects or diseases which will be,	in conformity with predictions of the Cooperative Extension Specialists in the area and/or teacher of vocational agriculture.
References are on page 162	2. Given a specified crop or a group of crops,	the student will specify the kinds and quantities of materials needed for chemical control of insects and diseases likely to be problems,	the specifications regarding kind of chemicals will be in conformity with the published recommendations of the Cooperative Extension Service and quantities recommended for the season will meet 100% of the normal seasonal needs as determined by the recommendations of the Cooperative Extension Service.
	3. Given an assignment of a specific crop, or group of crops,	the student will prepare a written plan for biological control of insects or diseases likely to attack the growing crop,	which will be in 95% agreement with the Cooperative Extension Service and/or a jury of 3-5 adults in the community who are recognized as being knowledgeable in the use of biological controls.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Plant Science) USOE Code Number: 01.01 02

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PREPARING AN INSECT AND DISEASE CONTROL PROGRAM FOR GROWING CROPS	4. Given a specified crop or group of crops,	the student will prepare a written list of varieties that are resistant to insects and/or diseases and to indicate the resistant varieties that are suitable for use in the area.	the students list and recommendations will be 95% or better accurate as compared with recommendations of the Cooperative Extension Service and/or teacher of vocational agriculture.

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Program Area: Agricultural Production (Plant Science) USOE Code Number: 01.01 02

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
OPERATING, ADJUSTING, SERVICING, AND STORING FARM EQUIPMENT USED IN CONTROLLING WEEDS, INSECTS, AND OTHER PESTS References are on page 162	1. Given a field (area) on a farm which represents a pest problem,	the student will: a. select the appropriate size tractor and chemical applicator for the job to be performed b. attach the chemical applicator to the farm tractor c. follow manufacturer's directions, label restrictions and all safety precautions in mixing chemicals d. safely operate the farm tractor in applying chemicals e. adjust the chemical applicator for correct application f. record application rates and schedules,	so that the operation meets the standards of the farm operator or a designated person.
	2. Given access to a farm tractor and a chemical applicator which has been used to control pests,	the student will: a. clean the farm tractor and chemical applicator b. lubricate and service the farm tractor and chemical applicator c. properly store the farm tractor and chemical applicator d. store the remaining chemical in a safe manner,	by following recommendations in given service manual and to the satisfaction of the farm operator or a designated person.

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Program Area: Agricultural Production (Plant Science) USOE Code Number: 01.01 02

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
HARVESTING FARM CROPS References are on page 163	1. Given access to various types of farm crops to be harvested,	the student will: a. determine when to harvest various types of crops b. select the appropriate equipment to be used to carry out the harvesting operations,	so that optimum yield in quality and quantity can be obtained.
	2. Given access to the appropriate farm equipment and the responsibility of harvesting various types of farm crops,	the student will: a. prepare the machine for harvesting b. prepare the field for harvesting, such as plowing the edges of the field for smooth turning and maneuvering c. make arrangements for transporting the crop from the field to designated site d. safely operate the harvesting equipment when harvesting or transporting the machine from one location to another,	in conformity with the operator's manual, for the respective piece of equipment so that the harvesting operation is performed safely and efficiently.
	3. Given access to farm harvesting equipment and the responsibility of properly storing the equipment,	the student will: a. lubricate and service various types of harvesting equipment b. clean various types of harvesting equipment c. properly store various types of harvesting equipment	so that when the machinery is used for further harvesting, the equipment will operate efficiently and effectively.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
DRYING FARM CROPS References are on page 164	1. Given access to various types of farm crops to be dried,	the student will: a. determine the moisture content of each crop within ±2 through visual examination of the crop or by using devices designed to measure moisture content b. recommend drying equipment and facilities needed for drying crops,	so that crops can be dried according to the requirements of the market or for storage, as determined by the instructor.
	2. Given the task of drying crops with the use of drying facilities and equipment,	the student will safely operate and maintain grain drying facilities to dry crops,	according to the operator's manual and the drying need as determined by the instructor or employer.

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Program Area: Agricultural Production (Plant Science) USOE Code Number: 01.01 02

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
HANDLING AND STORAGE OF FARM CROPS References are on page 164	1. Given access to farm crops handling equipment and information regarding the type and quantity of crops to be relocated,	the student will: a. plan and select the type of materials handling equipment needed for efficient flow and distribution of crops b. demonstrate the safe operation of the materials handling equipment c. select and use the appropriate tools to adjust and lubricate the materials handling equipment for maximum efficiency,	so that the plan for relocating the crops and the demonstration of operation and servicing of the equipment is in conformity with the directions in the operator's manual and satisfactory to the employer or instructor.
	2. Given access to farm crops storage facilities and information pertinent to the type and quantity of crops to be stored,	the student will: a. determine the type and size of facilities needed to provide adequate storage b. safely operate the materials handling equipment in storing crops in storage facilities c. determine the amount of crops in storage facilities d. determine the condition of stored crops e. select and use the appropriate tools to adjust and lubricate the storing facilities for maximum efficiency,	so that in the opinion of the employer, the type and size of storage facilities are adequate, the amount and condition of the crops in storage are accurately recorded, and the operation and servicing of the equipment is in accordance with the operator's manual and the direction's of the employer.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
GRADING FARM CROPS References are on page 164	1. Given access to a specific farm crop and the criteria for grading,	the student will determine the market grade,	according to the United States Department of Agriculture grading standards.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Plant Science) USOE Code Number: 01.01 02

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
OPERTING HAY AND FORAGE EQUIPMENT References are on page 165	1. Given the type of crop and number of acres to be harvested and access to various types of hay and forage equipment,	the student will: a. identify the various types of hay and forage equipment and explain their operating principles b. select the appropriate type of equipment for harvesting the crop c. if needed, select the appropriate size tractor for pulling the machinery d. attach various types of hay and forage machinery to a farm tractor e. safely operate various types of hay and forage equipment to cut the crops f. adjust various types of hay and forage machinery for maximum efficiency,	as recommended by given operator's manual and to the satisfaction of the farm operator.
	2. Given access to hay and forage machinery that has been used on the farm,	the student will: a. lubricate and service various types of hay and forage machinery b. clean various types of hay and forage equipment c. properly store various types of hay and forage machinery,	by following recommendations in given service manuals and to the satisfaction of the farm operator or a designated person.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Plant Science) USOE Code Number: 01.01 02

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
OPERATING VARIOUS TYPES OF MACHINERY USED FOR HANDLING MATERIALS ON THE FARM References are on page 166	1. Given the type and quantity of materials to move from a location on the farm and access to materials handling equipment used on farms,	the student will: a. identify the more common types of material handling equipment (farm wagons, manure spreaders, frontend loaders, etc.) and explain their operating principles b. select the most desirable size farm tractor and material handling equipment for the job to be done c. attach various types of material handling machinery to farm tractor d. safely operate the more common types of materials handling equipment to move farm products e. adjust various types of materials handling machinery for maximum efficiency,	as recommended by given operator's manual and to the satisfaction of the farm operator or a designated person.
	2. Given access to various types of materials handling machinery that has been used on the farm,	the student will: a. lubricate and service various types of materials handling machinery b. clean various types of materials handling equipment c. properly store various types of materials handling farm equipment,	by following recommendations in given service manuals and to the satisfaction of the farm operator or a designated person.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Farm Mechanics) USOE Code Number: 01.01 03

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PLANNING AND ESTABLISHING A FARM SHOP OR SERVICE CENTER References are on page 167	1. Given a specific type and size of farm together with an inventory of farm machinery, buildings, and equipment,	the student will: a. list the types of repair, construction, and service jobs that should be done on the farm to support the activities of the farm b. list the hand and power tools and equipment needed for a shop and service center for the farm c. specify the square feet of floor space and height of ceilings needed for the construction, repair, and equipment jobs likely to be undertaken,	so that the lists and specifications are in line with specifications of the instructor and/or three successful farm operators of the same type of farm as the student is studying.
	2. Given the type of repair, construction, and service jobs to be performed on the type of farm specified in Objective 1 together with the list of tools and equipment to be placed in the shop,	the student will: a. specify the electrical needs for lighting and operation of the tools and equipment to be including in the shop b. determine the interior arrangement of the farm service center including the: 1. work area 2. location of power tools 3. hand tool storage areas 4. other storage areas c. determine the location and size of overhead door	the recommendations will be in line with the building and electrical codes and in conformity with the specifications of three successful farm operators of the area.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Farm Mechanics) USOE Code Number: 01.01 03

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PLANNING AND ESTABLISHING A FARM SHOP OR SERVICE CENTER		d. determine the requirements for heating the shop including: 1. area to be heated 2. size and kind of heater e. determine location and size of windows and access doors,	
	3. Given the planned size, location, and interior arrangement of the proposed farm service center,	the student will: a. determine the cost and availability of materials for construction of the building b. select the type of construction materials to provide a serviceable building at optimum cost,	the recommendations of the student will be in conformity with building codes of the area and recommendations will be in line with the specifications of three successful farm operators of the area appointed by the instructor.

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Program Area: Agricultural Production (Farm Mechanics) USOE Code Number: 01.01 03

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
REPAIRING AND MAINTAINING HAND AND POWER TOOLS	1. Given the power tools listed for Module #1 together with their components,	the student will: a. identify those with cutting edges that are practical to sharpen in the farm service center b. sharpen the cutting edges of each tool,	the work of the student will be in line with the recommendations of the manufacturer or other authority recommended by the instructor.
References are on page 167	2. Given hand or power tools in need of maintenance or minor repair,	the student will: a. identify the necessary operations b. perform the maintenance operations c. make the needed repairs,	so that all safety standards are met and the tools are in satisfactory working condition according to the manufacturer's specifications and to the satisfaction of the instructor.
	3. Given the power tools listed in Module #1 and access to the appropriate farm service center,	the student will plan and install storage facilities for the tools,	which will meet the standards previously specified by the instructor, the farm operator, or another person appointed by the instructor.

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Program Area: Agricultural Production (Farm Mechanics) USOE Code Number: 01.01 03

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
WEARING SUITABLE CLOTHING AND OTHER SUITABLE PROTECTION DEVICES WHILE WORKING IN THE FARM SHOP References are on page 168	1. Given a farm shop situation for the type of farm being studied,	the student will use safety practices as to: a. selection of suitable clothing b. wear clothing correctly c. use eye and ear protection equipment d. demonstrate correct (safe) work practices,	in line with standards of the State and National Safety Council as interpreted by the instructor or a designated person.

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Program Area: Agricultural Production (Farm Mechanics) **USOE Code Number:** 01.01 03

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
OPERATING OXY-ACETYLENE WELDING EQUIPMENT References are on page 168	1. Provided the appropriate oxy-acetylene welding equipment and pieces of steel or cast iron of various thicknesses,	the student will cut steel or cast iron,	well enough that the pieces fit intended purposes as determined by the instructor.
	2. Given various types of metals to be welded and the appropriate welding equipment,	the student will perform butt and fillet welds in various positions that when the following welding process are completed: a. welding with steel rods b. bronze welding c. welding cast iron d. hardsurfacing e. fusion welding without a rod,	the metals welded will be of sufficient strength for the required operating conditions determined by the instructor.
	3. Given access to gas welding equipment, accessories and various types of metals to be welded for cut,	the student will apply safety practices while performing various types of welds or cuttings,	which will prevent injury to the body, other workers or damage to the equipment as determined by the instructor.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Farm Mechanics) **USOE Code Number:** 01.01 03

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
OPERATING ARC WELDING EQUIPMENT	1. Given a specified number of metals found in agricultural equipment,	the student will identify,	95% of the metals by their common names as previously established by the instructor or by an individual he/she designates.
References are on page 169	2. Given a task of welding two pieces of metal together and the appropriate arc welding equipment,	the student will perform the following tasks to produce a weld: a. prepare the metal for welding b. select the appropriate electrode c. select and adjust the proper current setting d. strike the arc e. maintain the proper arc length f. maintain the proper speed of travel g. run a bead,	of sufficient strength for the required operating conditions as previously established and satisfaction of the instructor or a person he/she designates.
	3. Given a metal to te welded and the appropriate welding equipment,	the student will follow safe operating procedures,	to prevent injury to himself/herself, other workers or damage to the equipment in accordance with previously established safety standards.
	4. Given metals to be welded and the appropriate welding equipment,	the student will prepare the metal and perform butt and fillet welds in the following positions:	of sufficient strength for the required operating conditions in accordance with previously established standards and to

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
OPERATING ARC WELDING EQUIPMENT		a. flat b. horizontal c. vertical d. overhead,	the satisfaction of the instructor or a person he/she designates.
	5. Given specified operations to perform with the welder,	the student will prepare the metal and perform the following operations: a. weld cast iron b. cut and groove c. hardsuraace d. use the carbon torch,	in accordance with previously established standards of the instructor or a person he/she designates.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PLUMBING References are on page 169	1. Given information regarding the water supply requirements for a specific farmstead and farm home,	the student will select and recommend the kind and size of pump to supply the water requirements,	recommendations of the student will meet the requirements of the farm home and the farmstead as indicated by the specifications of the manufacturer and verified by the instructor.
	2. Given the information for the farmstead and farm home which was provided for Objective #1,	the student will prepare plans for: a. a sewage system to dispose of wastes for the farm home b. a waste disposal system for the farmstead (barns, feed-lots, etc.)	which conforms with the standards of the local sanitary engineer in terms of local state codes, adequate capacity as verified by the instructor and/or a designated person.
	3. Given information regarding the distribution of hot and cold water in the farm home and other farm buildings,	the student will select and install the pipe and the fixtures to distribute the water to the specified area,	in the appropriate quantities and in conformity with a plan previously approved by the instructor and/or a designated person.
	4. Given the approved plans for sewage disposal for the farm home,	the student will: a. select the materials needed for installing the system b. install the sewage system,	in conformity with the plan previously approved by the instructor and/or a designated person.
	5. Given a plan for waste disposal for the farmstead	the student will: a. select necessary materials to install the system b. install the system,	in conformity with the plan previously approved by the instructor and/or a designated person.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PAINTING FARM BUILDINGS References are on page 170	1. Given an inventory of farm buildings and equipment (other than metal) on a type of farm similar to the type the student is studying,	the student will: a. recommend the type of paint and/or preservative to be used on each building and piece of equipment, b. select the brand of each kind of paint and preservative c. specify the preparation of the building or equipment prior to painting d. specify the steps in preparation of the material to be applied e. determine the method of application (spray, brush, roller, etc.)	to the satisfaction of the instructor or a designated person and in conformity with the recommendations of an experienced painter in the community.
	2. Given a farm building or piece of equipment (other than metal) and access to appropriate tools and equipment,	the student will: a. prepare the paint or preservative for application b. prepare the building or equipment for painting c. apply the paint or preservative,	in conformity with the recommendations of a professional painter in the area as verified by the instructor.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PLANNING FARMSTEAD BUILDINGS References are on page 170	1. Given a specific farm of the type the student is studying and data regarding the present and projected size of enterprises,	the student will: a. inventory the present buildings b. prepare an analysis of each building as to its adaptability and efficiency for the farming operation c. prepare sketches and plans for remodeling or replacing buildings d. prepare a schedule indicating approximate years when each building should be remodeled or replaced e. prepare a sketch, bill of materials and estimated cost for remodeling and/or replacing the building listed as first priority in the list,	to the satisfaction of the farm operator and verified by the instructor.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
USING CONSTRUCTION PLANS AND BLUEPRINTS References are on page 171	1. Given a construction plan or blueprint of a farm building,	the student will: a. prepare a bill of materials needed for the construction including the measurements and cuts to be made for each piece b. calculate the areas in square feet of: 1. floor 2. roof 3. windows 4. doors c. calculate in cubic feet the: 1. footings 2. foundations 3. concrete floors d. determine the roof pitch and rafter constructions to be used,	with 95% accuracy as determined by the instructor and/or a designated person.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
SELECTING LUMBER, HARDWARE, AND OTHER BUILDING MATERIALS References are on page 171	1. Given plans for a building for the type of a farm being studied,	the student will: a. select the appropriate kind and grade of lumber for various uses in the construction of the building b. select appropriate roofing for the structure in terms of cost and serviceability c. select doors, windows, ventilators, and other equipment appropriate for the proposed use of the building d. specify the kind of material and method of application for appropriate insulation of the building e. specify appropriate materials for walls, ceiling, and interior of the building f. specify appropriate hardware for use in the building,	in accordance with building codes and in conformity to the specifications of a committee of three contractors and verified by the instructor.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PREPARING BUILDING SITES AND FOUNDATIONS References are on page 172	1. Given access to a proposed building site together with building plans,	the student will provide assistance in: a. preparing the site by grading and leveling b. laying out the foundation c. constructing the foundation,	according to building plans and approval of the instructor in terms of the practices demonstrated.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Farm Mechanics) USOE Code Number: 01.01 03

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
CONSTRUCTING FARM BUILDINGS References are on page 173	1. Given access to building materials to be used in constructing a farm building or a farm building undergoing extensive remodeling,	under the direction of a supervisor the student will: a. lay sub-flooring b. cut and place wall, ceiling, and roof framing c. lay roofing materials d. construct exterior walls e. install windows and doors,	using recommended practices and to the satisfaction of the supervisor and/or instructor.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
USING CONCRETE ON THE FARM References are on page 173	1. Given access to a farm of the type being studied,	under the direction of a supervisor the student will: a. list the needed installations in which concrete will be used as the sole or major construction material b. recommend the type of concrete construction, i.e. block, poured concrete, other. c. build forms for a poured concrete structure d. place concrete in forms e. lay concrete blocks f. finish concrete for appropriate surface g. remove forms and cure concrete,	to the satisfaction of the supervisor and in conformity with the directions for the specific job.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Farm Mechanics) USOE Code Number: 01.01 03

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
CONSTRUCTING AND MAINTAINING FARM FENCES References are on page 174	1. Given access to a farm of the type the student is studying together with available maps, sketches of field lay-outs cropping programs, land use capabilities, etc.,	the student will: a. prepare a sketch showing fence lay-out to fit the cropping plan and indicating the passage ways b. determine the types and quantities of fencing to be used,	to the satisfaction of the instructor or a designated person.
	2. Given access to the farm used in Objective #1, together with the approved plans and necessary fencing materials and tools,	the student will: a. prepare a fence line b. construct a specified fence,	in line with the instruction of a supervisor designated by the farm operator and approved by the instructor.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
OPERATING AND CARING FOR SMALL GASOLINE ENGINES References are on page 175	1. Given access to a number of small 2 and 4 stroke-cycle gasoline engine,	the student will: a. explain (in writing or orally) the principles of operation of each type b. refuel and start a small gasoline engine c. operate the engine under load,	with 95% accuracy in terms of identification of the type of engine and demonstrating starting and operating procedures and in 95% agreement with instructions in the manual for operator safety and optimum engine operation.
	2. Given access to a small gasoline engine that has been operating in the field,	the student will: a. clean the engine to: 1. avoid damage from dirt entering the engine 2. assure optimum cooling b. prepare the engine for a two month or more storage period,	in conformity with the recommendations in the manual and to the satisfaction of the instructor or a designated person.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Farm Mechanics) **USOE Code Number:** 01.01 03

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
MAINTAINING SMALL GASOLINE ENGINES References are on page 175	1. Given access to a variety of small gasoline engines, the operators manuals, and appropriate tools,	the student will: a. identify and service each of the types of carburetor air cleaners b. identify and service each of the types of fuel strainers c. change oil in a 4 stroke-cycle small gasoline engine d. service spark plug on 2 and 4 stroke-cycle engines e. adjust carburetor of small gasoline engines for optimum operation,	in 95% conformity with instructions in the operators manual and to the satisfaction of the instructor and/or a designated person.

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Program Area: Agricultural Production (Farm Mechanics) **USOE Code Number:** 01.01 03

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
SERVICING THE BATTERY References are on page 176	1. Given a farm tractor or other machine with a battery, together with the operators manual and necessary supplies,	the student will: a. clean the outside of the battery b. treat the terminals to prevent corrosion c. check for loose connections d. check and adjust the fluid level in the battery e. check the charge in the battery,	in conformity with the directions in the operators manual and to the satisfaction of the instructor.
	2. Given a farm tractor with a battery that needs a charge,	the student will: a. remove the battery and place it on a charger b. adjust the amperage for charging c. remove the battery at the end of the charge d. check the charge of the battery e. install the battery back in the tractor f. check the battery for normal functioning,	in conformity with the service manual and to the satisfaction of the instructor.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
SERVICING THE ELECTRICAL SYSTEM References are on page 176	1. Given a farm tractor or other power driven farm machine together with the operator's manual and appropriate tools and supplies,	the student will: a. trace the light circuits of the machine b. trace the air conditioning circuits of the machine c. trace the accessory circuits of the machine,	according to the manual and to the satisfaction of the instructor.
	2. Given a farm tractor or other power driven farm machine together with the operator's manual and appropriate tools and supplies,	the student will check each circuit for: a. breaks and/or loose connections b. malfunctioning of components c. shorts and grounds and make necessary repairs and replacement of parts,	in accordance with the manual and to the satisfaction of the instructor.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
REMOVING AND REPLACING THE STARTER References are on page 177	1. Given a farm tractor or other power driven farm machine together with appropriate tools and the service manual for the machine,	the student will remove and replace the starter,	in conformity with the specifications in the service manual and in not more than double the time specified by the manual for service shop operation. Evaluation will be by the instructor or a designated person.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
SERVICING THE COOLING SYSTEM References are on page 177	1. Given a water cooled engine together with appropriate supplies and tools,	the student will check the fluid in the radiator and adjust for protection against freezing and for optimum cooling,	as specified in the service manual for the machine and in a time not to exceed double that specified for qualified mechanics in the service shop. Evaluation will be by the instructor or by a designated person.
	2. Given a water cooled engine together with appropriate supplies,	the student will clean the outside of the radiator and check, adjust, or replace the fan belt as needed,	according to the specifications in the service manual for the machine and in a time not to exceed double that specified for qualified mechanics in the service shop. Evaluation will be by the instructor or a designated person.
	3. Given an air-cooled engine together with appropriate supplies,	the student will clean the cooling fins of the engine,	according to the directions in the service manual for the engine and in a time not to exceed double that specified for qualified shop mechanics in the service shop. Evaluation will be by the instructor or by a designated person.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
LUBRICATING THE FARM TRACTOR AND SERVICING THE AIR CLEANER References are on page 178	1. Given a power driven farm machine and appropriate tools and supplies,	the student will change the oil in the engine,	according to specifications in the manual and in not more than double the time specified for mechanics in the service shop. Evaluation will be by the instructor or a designated person.
	2. Given a power driven farm machine and appropriate tools and supplies,	the student will clean and/or replace the air cleaner,	according to specifications in the manual and in not more than double the time specified for mechanics in the service shop. Evaluation will be by the instructor or a designated person.
	3. Given a power driven farm machine and appropriate tools and supplies,	the student will lubricate the linkage on the machine,	according to specifications in the manual and in not more than double the time specified for mechanics in the service shop. Evaluation will be by the instructor or a designated person.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
LUBRICATING THE FARM TRACTOR AND SERVICING THE AIR CLEANER	4. Given a power driven farm machine and appropriate tools and supplies,	the student will check and adjust and change fluid in the differential,	according to specifications in the manual and in not more than double the time specified for mechanics in the service shop. Evaluation will be by the instructor or a designated person.
	5. Given a power driven farm machine and appropriate tools and supplies,	the student will lubricate wheel bearings,	according to specifications in the manual and in not more than double the time specified for mechanics in the service shop. Evaluation will be by the instructor or a designated person.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
CHECKING AND REPLACING TRANSMISSION FLUID References are on page 179	1. Given a power driven farm machine and appropriate tools and supplies,	the student will check transmission fluid, change transmission fluid and change filters,	according to the specifications in the manual and in a time not to exceed double that specified for qualified mechanics in the service shop. Evaluation will be by the instructor or by a designated person.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
CHECKING AND SERVICING BRAKES References are on page 179	1. Given a power driven farm machine and appropriate tools and supplies,	the student will check and service brakes,	according to instructions in the manual and in a time not to exceed double that for a qualified mechanic on a similar machine. Evaluation will be by the instructor or a designated person.
	2. Given a power driven farm machine and appropriate tools and supplies,	the student will check and service the hydraulic system controlling the brakes,	according to instructions in the manual and in a time not to exceed double that for a qualified mechanic on a similar machine. Evaluation will be by the instructor or a designated person.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
CHECKING AND SERVICING THE HYDRAULIC LIFT AND/OR THE HYDRAULIC SYSTEM OF OTHER FARM MACHINES	1. Given a power driven hydraulic system, or lift, on a farm machine together with appropriate tools and supplies,	the student will check and adjust the system for optimum operation,	according to specifications in the service manual and in a time not to exceed double that for a qualified mechanic on a similar machine.
References are on page 180	2. Given a power driven hydraulic system, or lift, on a farm machine together with appropriate tools and supplies,	the student will diagnose and correct malfunctioning in the system,	according to specifications in the service manual and in a time not to exceed double that for a qualified mechanic on a similar machine.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
CHECKING AND INFLATING TIRES References are on page 180	1. Given the assignment to periodically check tires of specific farm machine,	the student will: a. check tire pressures periodically b. maintain a record of tire pressures and dates of checking, over a specified period of time,	the records of the student will be checked and approved by the farm operator and submitted to the instructor for evaluation and recording. Evaluation will be based on the evidence of reliability of the student in checking the tires and on the inflation pressures compared with specifications in the manual.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
TRANSMITTING POWER VIA BELTS AND PULLEYS References are on page 180	1. Given the problem of transmitting power via belts and pulleys from a source of power to a driven machine,	the student will specify the location of the power source and the driven machine in relation to each other and to determine the length and size of V-belt(s) needed,	the specifications will be in conformity with previously established standards as determined by the instructor.
	2. Given a specified source of power, a machine to be driven at a specified speed via belts and pulleys,	the student will: a. determine the size of pulleys required b. select the pulleys and necessary belts c. install the machine,	so that the speed of the driven machine is within 5% of that specified.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PLANNING USE OF ELECTRICITY FOR HEATING, COOLING, AND/OR MATERIALS HANDLING References are on page 181	1. Given an assignment to visit a farm in the community to investigate need for additional use of electric power,	the student will identify situations where additional use of electricity for heating will add to the efficiency of the farm operation. The student will recommend a plan for the additional use of electricity for heating,	which is accurate enough for the electrician to prepare cost estimates and installation plans to accomplish the desired results. The representative of the power company will evaluate the plans of the student by placing them in four categories based on criteria established by the instructor and the students at the time the project was initiated.
	2. Given an assignment to visit a farm in the community to investigate need for additional use of electric power,	the student will identify situations where additional use of electricity for cooling will add to the efficiency of the farm operation. The student will recommend a plan for the additional use of electricity for cooling,	which is accurate enough for the electrician to prepare cost estimates and installation plans to accomplish the desired results. The representative of the power company will evaluate the plans of the student by placing them in four categories based on criteria established by the instructor and the students at the time the project was initiated.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PLANNING USE OF ELECTRICITY FOR HEATING, COOLING, AND/OR MATERIALS HANDLING	3. Given an assignment to visit a farm in the community to investigate the need for additional use of electric power,	the student will identify situations where additional use of electricity for materials handling will add to the efficiency of the farm operation. The student will recommend a plan for the additional use of electricity for materials handling,	which is accurate enough for the electrician to prepare cost estimates and installation plans to accomplish the desired results. The representative of the power company will evaluate the plans of the students by placing them in four categories based on criteria established by the instructor and the students at the time the project was initiated.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
IDENTIFYING AND REPLACING DEFECTIVE PARTS IN FARM MACHINES References are on page 181	1. Provided access to farm machines and appropriate tools,	the student will diagnose the cause of malfunctioning and identifying defective parts,	the diagnosis of the cause of malfunctioning and identification of defective parts will be in 95% agreement with that of a qualified mechanic in a farm implement service shop.
	2. Provided access to farm machines with defective parts, and appropriate tools,	the student will determine the code number of the parts,	with 95% accuracy as determined by the instructor.
	3. Provided access to farm machines, replacements, and defective parts, and appropriate tools,	the student will install the parts and adjust the machine for optimum operation,	in accordance with the operator's manual. Time required will be no more than double that suggested in the manual for qualified farm machinery mechanics. Evaluation will be by the instructor or a designated person.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
OPERATING FARM TRUCKS IN TRANSPORTING AGRICULTURAL MACHINERY AND COMMODITIES References are on page 181	1. Given access to one or more farm trucks,	the student will: a. identify and explain the functions of the controls, instruments, and other parts on various types of farm trucks b. check fuel, oil, battery, and radiator c. start the engine d. start the truck movement forward e. operate the truck movement while in forward motion f. stop the forward movement of the truck g. start, operate, and stop the movement of the farm truck while backing up,	so that previousiy established safe driving practices are used as determined by the instructor or a designated person.
	2. Given access to a farm truck and the responsibility of transporting agricultural equipment to a designated site,	the student will: a. hitch the transporting vehicle to the farm truck b. load farm equipment on the truck or the transporting vehicle c. safely operate farm truck in transporting farm machinery to designated site d. unload farm machinery,	without injuring human bodies or without damage to farm truck, machinery, motor vehicles, or other objects, and with 95% observation of previously established safety practices.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
OPERATING FARM TRUCKS IN TRANSPORTING AGRICULTURAL MACHINERY AND COMMODITIES	3. Given the responsibility of transporting agricultural commodities to designated site,	the student will: a. visually check the condition of the truck for proper operation b. manually or mechanically load the truck c. weigh the farm truck and commodities before transporting d. safely operate farm truck to transport commodities e. manually or mechanically unload the truck f. clean and store farm truck after use,	without injuring human bodies or without damage to farm truck, the agricultural commodities, motor vehicles, or other objects, and with 95% observation of previously established safety practices.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
USING SAFETY PRACTICES IN OPERATING FARM MACHINERY References are on page 182	1. Given information regarding the safe operation of farm tractors, self-propelled combines, farm trucks, and other types of power driven farm equipment,	the student will: a. demonstrate and explain why one should be physically capable of operating farm equipment b. demonstrate and explain why one should be physiologically capable of operating farm equipment c. demonstrate and explain why one should be psychologically capable of operating farm equipment d. explain safety precautions necessary for the safe operation of farm equipment e. identify and explain various safety driving symbols f. demonstrate the proper use of hand signals as published by the American Society of Agricultural Engineers (ASAE),	so that the student is proficient in operating the equipment in a safe and efficient manner, and to the satisfaction of the instructor or a person designated.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
USING SAFETY PRACTICES IN OPERATING FARM	2. Given access to various types of farm machinery,	the student will perform the following tasks: a. identify and explain the functions of the controls, instruments and other parts on farm machinery b. check fuel, oil, battery, and radiator if applicable c. start the engine d. start the farm machinery movement forward e. operate the machinery while in forward motion f. stop the forward movement of the machinery g. start, operate, and stop the movement of the farm machinery while backing up,	in a safe and efficient manner, and to the satisfaction of the instructor or a person designated.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
REPAIRING FARM BUILDINGS References are on page 183	1. Given access to equipment and materials, and the responsibility of repairing a farm building,	the student will: a. determine and select the materials (roofing, siding, foundation, etc.) needed for repairing the building b. repair the foundation by mixing and pouring concrete c. replace broken windowpanes d. repair doors and gates and hang them e. repair wood siding and add braces to farm buildings f. repair the roof,	according to recommendations of construction and materials supply specialists and to the satisfaction of the farm operator.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
DETERMINING LAND USE CAPABILITY	1. Given access to an area of land in the school community,	the student will determine the land use capability,	with 95% accuracy as determined by the Soil Conservation personnel in the area.
	2. Given access to an area of land in the school community,	the student will assess the erosion hazards and recommend erosion controls,	which will be in conformity with recommendations of the Soil Conservation Service or the Cooperative Extension personnel working in the area.
References are on page 183	3. Given access to an area of land in the school community,	the student will assess the drainage problems of the area and recommend land use practices	which will be in conformity with recommendations of the Soil Conservation Service or the Cooperative Extension personnel working in the area.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
DETERMINING WATER HOLDING CAPACITY OF THE SOIL	1. Given a number of land areas of different classes in the vicinity of the school,	the student will determine the relative water holding capacity of the soil in each area,	with 95% accuracy as compared with the determination by the local Soil Conservation Service representative.
References are on page 183	2. Given one or more land areas included in Objective #1 above,	the student will suggest, in writing, three or more methods for increasing the water holding capacity of the soil in the area,	95% of the suggestions of the student will fall within a similar list provided by the instructor or a designated person.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
DETERMINING THE FEASIBILITY OF IRRIGATING References are on page 183	1. Given a specified area and the crops to be grown on the area,	the student will: a. determine the average amount and timeliness of rainfall in the area b. determine how much increase in yield can be expected from irrigating field crops in the area c. list and explain several reasons why yields increase when ample water is used for irrigation d. determine whether the field and soil conditions are such that an irrigation system can be operated e. list and explain other advantages of irrigating crops (e.g. protecting crops from frost and freezing; distribution of liquid fertilizers, pesticides, and animal waste) f. determine the sources of adequate water g. determine the availability of water h. determine the quality of the water in the area	according to weather bureau charts and graphs and Cooperative Extension reports and to the satisfaction of the instructor.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
DETERMINING THE FEASIBILITY OF IRRIGATING	2. Given information in regard to a farm area and the cropping program,	the student will: a. explain in writing the basic operating principles involved in common irrigation methods and systems used in the region b. recommend an irrigation program for the farm area,	to the satisfaction of the instructor and based on 95% accurate appraisal as determined by the instructor or a designated person.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PLANNING A SPRINKLER IRRIGATION SYSTEM References are on page 184	1. Given the responsibility of planning a sprinkler irrigation system for an area of crop land,	the student will: a. make an inventory of available resources and operating conditions (e.g. information on soils, topography water supply, source of power, crops, and farm operation schedules) b. prepare plans to submit to an irrigation specialist for a plan and cost estimate,	to the satisfaction of the instructor or a designated person.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
DETERMINING IRRIGATION COST AND RETURN ON INVESTMENT References are on page 185	1. Given specifications for purchase of a sprinkler irrigation system,	the student will: a. obtain the cost of each item needed for installing an irrigation system from a dealer or contractor and list these amounts in the correct column in a cost and return form b. determine the total initial cost of items needed for installing an irrigation system and record this information in the appropriate space in a cost and return form,	with 95% accuracy in the calculations and legibly written statements in the correct column of the cost and return form as determined by the instructor.
	2. Given the installation plans for the irrigation system including all specifications as to equipment, type and capacity,	the student will: a. use given table to determine the cost factors of each item based on a specified interest rate and the expected length of life and record this information in the cost and return form b. determine the annual depreciation and interest for each item and record in the cost and return form c. estimate annual cost of taxes and insurance and record,	with 95% accuracy in the tabulations and legibly written statements in the correct column in the cost and return form as determined by the instructor.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
ELECTRICAL POWER-- IT'S NATURE AND MEASUREMENT References are on page 185	1. Given access to the electrical equipment and installation on a farmstead of the type being studied,	the student will: a. inventory the electrical equipment (i.e. lights, motors, heating and cooling equipment, etc.) b. determine and record the KW rating of each piece of equipment c. determine the KW of electrical energy used per month by one or more major pieces of electrical equipment based on estimated hours of operation and rate per KW d. sketch the circuit for one or more pieces of electrical equipment and indicate by label on the sketch the type of equipment needed (i.e. amperes, volts, watts, or alternating kind of conductors, etc.),	the data compiled by the student will be in 95% agreement with similar data compiled by the instructor or a designated person.
	2. Given a problem (actual or simulated) of recommending specifications for a major piece of electrical equipment for the farm,	the student will: a. calculate the amperes of current required for operation of the equipment when voltage is 120; 240 b. determine kinds and size of conductor required for each voltage based on distance from distribution point	the recommendations of the student will be in 95% agreement with the National Electric Code as determined by the instructor or a designated person.

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
ELECTRICAL POWER--IT'S NATURE AND MEASUREMENT		c. recommend voltage specification based on data from 1 and 2 above,	
	3. Given access to an electrical installation on a farm of the type being studied,	the student will: a. use a test lamp to determine "hot" and "cold" parts of a circuit b. determine voltage in the circuit c. identify and label potential electrical hazards (i.e. to workers, to livestock, to equipment, to buildings, etc.) d. recommend corrections to be made to minimize the hazards,	so that identification of "hot" and "cold" circuits; voltage in circuits; lists of hazards and their correction are all in agreement with those of the instructor or a designated person.

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Program Area: Agricultural Production (Farm Mechanics) USOE Code Number: 01.01 03

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
SELECTING AND USING CONDUCTORS References are on page 185	1. Given access to the type of farm the student is studying together with data from the National Electric Code,	the student will: a. determine and recommend the size and kind of conductor needed to carry current from the main distribution center to each of the branch circuit points on the farmstead b. determine and recommend the kind and size of conductor needed to carry the current from the branch circuit distribution point to the equipment c. recommend the insulation to be used for safe operation of the electrical equipment,	data and recommendations will be in conformity with the National Electrical Code as determined by the instructor or a designated person.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Farm Mechanics) **USOE Code Number:** 01.01 03

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PERFORMING SIMPLE WIRING TASKS ON THE FARM References are on page 186	1. Given the necessary materials and specified electrical circuits to be installed,	the student will: a. prepare schematic plans to provide a 120V circuit from a 240V source b. construct a 120V circuit which is separately switched and which provided a duplex outlet for a 120V power tool c. construct a 120V circuit with three way: (i.e. source-switch-switch-lamp, source-lamp-switch-switch, source-switch-lamp-switch),	so that insulation is prepared, connections are made, and grounding and polarization are in accordance with National Electric Code as determined by the instructor or a designated person.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Farm Mechanics) USOE Code Number: 01.01 03

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PLANNING AND INSTALLING MAIN SERVICE ENTRANCE References are on page 187	1. Given access to the type of farm the student is studying together with the data developed in Module--Electrical Power--It's Nature and Measurement,	the student will: a. sketch the farmstead layout indicating the electrical load at each major center of use (such as barns, house, farm shop and service center, etc.) b. plan the location of the major distribution center for the farm stead to provide a balanced load distribution, minimum of 2% voltage drop in feeders, and adequate overhead support for feeder lines,	with 95% accuracy in computations and in 100% conformity with specifications of the National Electrical Code as determined by the instructor or a designated person.
	2. Given an on-site installation or a mock-up similar to the installation for P.O. 1 above,	the student will: a. make connections which are polarized and securely fastened b. select and install protective devices of a type and capacity to protect circuits,	in accordance with the National Electric Code as determined by the instructor or a designated person.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Mechanics (Farm Mechanics) **USOE Code Number:** 01.01 03

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
SELECTING AND MAINTAINING ELECTRIC MOTORS References are on page 187	1. Given a collection of electric motors of various types, including a dual voltage, reversible motor,	the student will: a. perform the maintenance and service operations necessary for safe and efficient operation b. using a dual voltage, reversible motor, change the voltage and reverse the direction of the motor,	as specified by the manufactureer and verified by the instructor.
	2. Given data on motor types and characteristics, and equipment to be powered by electric motors,	the student will: a. select the appropriate motor for the specified job b. select the kind and size of drive which will operate the specified equipment according to the manufacturers specifications c. select overload protection,	in accordance with the manufacturers specifications as verified by the instructor or a designated person.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Farm Business Management) USOE Code Number: 01.01 04

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
USING APPLIED MATHEMATICS IN SOLVING PRACTICAL AGRICULTURAL PROBLEMS References are on page 189	1. Given the appropriate information and the task of calculating agricultural problems relative to lengths,	the student will: a. identify and explain the uses of ten (10) units of lengths used in agriculture b. convert units of length c. determine the length of three (3) problems given by the instructor,	so that the student will be proficient in calculating various lengths with a degree of accuracy established by the instructor prior to the beginning of the project.
	2. Given the required information and the responsibility of calculating agricultural problems pertinent to areas of various shapes,	the student will determine the areas for the following shapes: a. square b. rectangular c. triangle d. trapezoids e. circle f. irregular,	to the satisfaction of the instructor and so that the student will be efficient in calculating problems on the farm which pertain to areas of various shapes.
	3. Given needed information and the task of calculating agricultural problems relative to volumes,	the student will determine the volumes for the following shapes: a. cube b. rectangle c. pyramid d. cylinder e. cone f. irregular,	according to the accuracy and speed standards set by the instructor in calculating problems on the farm which pertain to the volumes of various shapes.
	4. Given the required information and the task of calculating agricultural problems in regard to weights,	the student will: a. identify and explain the uses of six (6) units of weights used in agriculture b. convert units of weight c. select and use scales in weighing agricultural commodities	so that the student will be proficient in determining the weight of various agricultural commodities with a degree of accuracy established by the instructor prior to the beginning of the project.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production(Farm Business Management) USOE Code Number: 01.01 04

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
USING APPLIED MATHEMATICS IN SOLVING PRACTICAL AGRICULTURAL PROBLEMS		d. determine weight by multiplying the unit weight times the calculated units in the total volume.	
	5. Given the required information and the task of calculating percentage problems relating to agriculture,	the student will: a. list and explain three (3) ways of expressing percent b. convert decimals to percent c. convert fractions to percent d. explain and demonstrate the proper use of rules to use in solving problems involving percent,	so that the student will be capable of determining percentages with a degree of accuracy established by the instructor prior to the beginning of the project.
	6. Given the required information and the task of calculating given proportion problems relating to agriculture,	the student will: a. verbally explain ratio expressions three (3) ways b. solve four (4) proportion problems given by the instructor,	so that the student will be proficient in solving problems of proportion with a degree of accuracy established by the instructor prior to the beginning of the project.
	7. Given the required information and the task of calculating interest rates for a loan,	the student will: a. calculate simple interest rate b. dollar cost c. true interest rate,	with 95% accuracy and within a time period specified by the instructor.
	8. Given the appropriate information and the task of calculating given depreciation problems,	the student will calculate the following types of depreciation problems: a. straight line b. declining balance c. sum of the digits,	with 95% accuracy and within a given time period established by the instructor.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Farm Business Management) USOE Code Number: 01.01 04

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
KEEPING FARM BUSINESS RECORDS References are on page 189	1. Given access to a particular farming operation and the past 3 years operating record as well as the appropriate recording forms,	the student will: a. list and explain in writing ten (10) reasons why farm records should be kept b. list and explain in writing five (5) types of important records that should be kept in order to provide an accurate financial picture of the farming operation c. calculate depreciation, correctly enter the results in a farm inventory book and calculate net worth d. using the cash account book and appropriate records correctly place and summarize the data in a Farm Cash Account booklet. e. Set up Farm Machinery Operation and Maintenance records f. correctly enter and summarize the data in the Production Record forms g. correctly record labor data in Labor Record book,	according to directions in given record forms so that when analyzing the financial situation of the farm, an accurate analysis and interpretation can be made.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Farm Business Management) USOE Code Number: 01.01 04

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PREPARING FARM BUDGETS References are on page 191	1. Given access to records of a specific farming operation, including income and expense items, inventories of soil capability, machinery and equipment, and other data, together with appropriate outlook data from reliable sources (USDA and others),	the student will: a. correctly set up budget(s) for given enterprise(s) b. correctly set up a complete trial budget for given farming operation c. set up a second complete trial budget and determine which budget would be the most profitable d. accurately work out an operating budget for a specific year showing income and cash expense for each enterprise and the total farm business,	according to recommended procedures in the record book and with 9[illegible]% accuracy.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Farm Business Management) USOE Code Number: 01.01 04

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
ANALYZING AND RECOMMENDING ADJUSTMENTS IN THE FARM BUSINESS OPERATION keferences are on page 191	1. Given access to farm business records and the responsibility of recommending ways for maximizing the farm operation	the student will analyze the farm business including: a. developing a farm business summary b. developing a farm business analysis c. preparing 10 financial statement analysis measures for the farm business d. prepare written recommendations for improving the efficiency of the farm business,	with an arithmetical accuracy of 95% and in 90% conformity with analysis of the Farm Management Specialist representing the Cooperative Extension Service in the local area.
	2. Given access to the previous 3 year records of a farm business,	the student will: a. set up partial budgets based on his estimates to determine the probable outcome of changes in given farming operations b. set up an annual operating budget based on recommended changes showing cash income and expenditures for the coming year c. work out a cash flow budget showing estimates of cash income and expenditures, and allowance for income and social security taxes,	according to recommended procedures of Farm Management Specialists and with 95% accuracy as determined by the instructor.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Farm Business Management) USOE Code Number: 01.01 04

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
FINANCING THE FARMING OPERATION References are on page 193	1. Given access to the financial records of a given farming operation,	the student will: a. prepare an analysis of 3 types of credit which may be appropriate for the farm including sources, costs and estimated returns to the farm business for the use of the credit b. prepare an operating budget for the farm business c. prepare an annual operating budget and other planned expenses in the total operation in preparing the cash flow budget,	to the satisfaction of the instructor in terms of the recommendations and with 95% accuracy in terms of arithmetical computations.
	2. Given the data developed in Objective I and approved by the instructor,	the student will prepare applications for a short-term and a long-term loan including for each: a. evidence of plan for expansion of the business b. present financial condition of the business c. proposed repayment schedule,	to the satisfaction of the instructor or a representative of a local lending agency.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Farm Business Management) USOE Code Number: 01.01 04

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PLANNING FARM POWER, MACHINERY AND EQUIPMENT NEEDS References are on page 194	1. Given information relative to the type of farming operation and number of acres,	the student will prepare recommendations for the machinery and equipment needed on the farm including: a. an inventory of the present machinery and equipment including size of units and their present conditions b. listing of additional needs for farm machinery and equipment to meet present needs and for anticipated needs for 1-5 years in the future. Additional needed items will specify size (capacity) of each machine c. an explanation in writing, justifying the need for each additional piece of equipment, including evidence of the feasibility of the purchase in economic terms d. recommend a record keeping system for the farm dealing with the purchase and use of farm machinery and equipment on the farm,	to the satisfaction of the instructor or an individual designated.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Farm Business Management) USOE Code Number: 01.01 04

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
DETERMINING AND SECURING FARM INSURANCE References are on page 194	1. Given a specific farm and farm family situation which is typical of the local community, together with insurance reference materials,	the student will: a. explain verbally or in writing the chances of loss, causes of loss and the effect of loss that may occur in a farm business b. explain verbally or in writing the kinds of life insurance and specify given examples where each kind is well adapted c. explain verbally or in writing the types of coverages available through different types of insurance plans (fire, crop, health, etc.) d. list and explain six (6) factors one should consider in selecting an agency from which to purchase insurance,	to the satisfaction of one or more local insurance executives and/or bankers designated by the instructor.
	2. Given the material prepared for Objective I including information about the Farm Operator and the Farm Family,	the student will plan the kinds of insurance and the approximate amounts he would recommend for the farm and the family,	to the satisfaction of one or more local insurance executives and/or bankers designated by the instructor.

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Program Area: Agricultural Production (Farm Business Management) USOE Code Number: 01.01 04

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
FULFILLING FARM TAX RESPONSIBILITIES References are on page 195	1. Given complete annual farm account records for a specific farm and information regarding the farm family and the appropriate forms and instruction books,	the student will complete the state income tax report for the farm using the appropriate tax rate schedules and records including necessary supporting data,	to the satisfaction of the instructor with 95% accuracy.
	2. Given complete annual farm account records for a specific farm and information regardnng the farm family and appropriate forms,	the student will complete the Federal income tax report for the farm using the appropriate tax rate schedules and records including necessary supporting data,	to the satisfaction of the instructor and with 95% accuracy.

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Program Area: Agricultural Production (Farm Business Management) USOE Code Number: 01.01 04

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
INTERPRETING AND UTILIZING FARM LAW References are on page 195	1. Given data on a specific farm operation on which production contracts have been (or may be) written,	the student will prepare the data and materials to be submitted to an attorney for use in preparing a production contract for the farm. The materials will include the student's recommendation as to: a. the type of contract b. provision for termination of the contract c. provision for single proprietorship, partnership or corporate organization d. recommendations as to qualification of the attorney who could write the contract e. provision in the contract relative to enforceability,	to the satisfaction of the instructor or a local attorney designated by the instructor.
	2. Given data on a specific farm operation in the local community including farm enterprises, equipment, labor, markets, marketing practices, financial obligations, etc.	the student will prepare written recommendations for the farm operator regarding: a. major precautions which should be taken in using farm workers b. landlord-tenant relationships c. farm operator-employee relationships d. drainage and water rights and responsibility e. pollution control responsibilities	to the satisfaction of the instructor or a designated person.

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Program Area: Agricultural Production (Farm Business Management) USOE Code Number: 01.01 04

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
INTERPRETING AND UTILIZING FARM LAW		f. responsibilities for livestock g. responsibilities regarding livestock diseases h. responsibilities related to custom work done for others or done for the operator i. regulations regarding trespassing,	

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MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
UNDERSTANDING THE FUNCTIONS AND OPERATIONS OF FARMER COOPERATIVES References are on page 196	1. Given a group of fellow students or another similar group and appropriate materials on farm cooperatives,	the student will assist the group to organize a real (or simulated) farmer cooperative. In the process of organizing, the student will explain to prospective members: a. the basic principles of cooperative organization b. the advantages (and disadvantages of cooperative organization for farmers c. the formation of the farmer cooperatives (marketing, supply, service, etc.) d. financing the cooperative e. functions and unique problems of managing a farmer cooperative,	so that the organization formed by the student group conforms to the standards of the instructor or a designated farmer cooperative member.

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Program Area: Agricultural Production (Farm Business Management) USOE Code Number: 01.01 04

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
USING GOVERNMENTAL SERVICES References are on page 198	1. Given a farm, or a larger agricultural area in the local community together with access to files of governmental agencies serving agriculture,	the student will list and explain government programs which may be available to: a. provide services to farmers b. assist individuals to start farming c. protect consumers,	so that he can present a list of governmental programs for agriculture from which selections may be made for local projects, and a list which is 100% accurate in terms of the literature as determined by the instructor.
	2. Given the data gathered in Objective I,	the student will, in a simulated situation apply, for one or more specified governmental assistance programs for agriculture including: a. securing the necessary forms and instructional materials b. completing and submitting the forms,	so that when the student is given the responsibility of obtaining, such services in a real setting, in the opinion of the instructor, such services can be acquired in an efficient manner.

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Program Area: Agricultural Production (Farm Business Management) USOE Code Number: 01.01 04

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PARTICIPATING IN FARM ORGANIZATIONS References are on page 198	1. Given membership in an agricultural class or other organized agricultural groups,	each student will: a. conduct a business meeting b. prepare a written analysis of a current agricultural issue c. make an oral presentation of a current agricultural issue, problem or situation before a group of people d. successfully participate in activities of the local FFA chapter or other organizations involving a broad spectrum of activities e. participate in a farmers organization,	evaluation will be by a jury of three or more members of the peer group, and based on previously agreed criteria regarding the level of participation to be required.

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Program Area: Agricultural Production (Farm Business Management) USOE Code Number: 01.01 04

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PERFORMING GENERAL OFFICE DUTIES References are on page 198	1. Given access to a common type office found on the farm,	the student will: a. answer the telephone b. clearly converse on the telephone c. record adequate information from a call taken for someone else d. place calls on the telephone e. prepare and mail a business letter f. file various forms and reports g. keep the office clean and organized h. order needed parts for farm machinery,	so that the communications in the office are clear, and the office is conducive for maximum output, and acceptable to the employer and/or instructor.

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VOCATIONAL AGRICULTURE RESEARCH PROJECT PERFORMANCE OBJECTIVES

Program Area: Agricultural Production (Farm Business Management) USOE Code Number: 01.01 04

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
OUTLETS FOR FARM PRODUCTS References are on page 199	1. Given a list of products typical of the type of farming the student is studying,	the student will: a. identify local outlets for the products moving from the farm b. determine minimum volume each outlet will accept c. determine seasonal variations in the requirements of each outlet d. determine grade specifications required by each outlet e. determine other requirements of each outlet f. determine ability of each outlet to absorb peak seasonal offerings,	the findings of the student will be in 95% conformity with the data compiled by the instructor.
	2. Given a list of products typical of the type of farming the student is studying together with the data from Objective #1,	the student will recommend a specific outlet for one of the major products of the type of farm he is studying and submit his reasons for the recommendations in writing,	the recommendations will be in 95% or better conformity with the factual data compiled by the instructor.

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Program Area: Agricultural Production (Farm Business Management) USOE Code Number: 01.01 04

MODULE TITLE	CONDITIONS	PERFORMANCE	CRITERIA
PLANNING WORK SCHEDULES AND SUPERVISING EMPLOYEES References are on page 199	1. Given the responsibility of supervising a group of employees and information relative to the type and quantity of work to be performed on a given type of farming operation during a specified time period,	the student will: a. plan simulated work loads and adequate working conditions for employees b. simulate supervising of employees by demonstrating with other students in the class,	so that 75% of students agree that the techniques which were demonstrated would be satisfactory under actual conditions.

APPENDIX B

Selected References for Teaching Agricultural Production

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
SELECTING LIVESTOCK OR POULTRY FOR THE FARM	1. Hunsley, R.E., Beeson, W.M., and Nordby, Julius E. Livestock Judging and Evaluation. Danville, Illinois: The Interstate Printers and Publishers, Inc. (IL/7).	Book	400/45
	2. Ensminger, M.E. Animal Science. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1969. (IL/7).	Book	400
	3. Ensminger, M.E. The Stockman's Handbook. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970. (IL/7).	Book	400
	4. Doane's Farm Management Guide. St. Louis, Missouri: Doane Agricultural Service, Inc., 1973. (MO/3).	Book	810
	5. Evaluating Pedigrees. East Lansing, Michigan: The Agriculture and Natural Resources Education Institute, Michigan State University. (MI/1).	Slide Set	410/34
	6. Judging Dairy Cattle. East Lansing, Michigan: The Agriculture and Natural Resources Education Institute, Michigan State University. (MI/1).	Slide Set	410/45
	7. USDA Bulletin F1263. Breeds of Swine. Washington, D.C.: U.S. Department of Agriculture, 1968. (DC/1).	Bulletin	440/30
	8. USDA Bulletin F2228. Beef Cattle Breeds. Washington, D.C.: U.S. Department of Agriculture, 1975. (DC/1).	Bulletin	420/30
	9. USDA Bulletin F2126. Farm Beef Herd. Washington, D.C.: U.S. Department of Agriculture, 1972. (DC/1).	Bulletin	420
	10. USDA Bulletin L429. The Meat--Type Hog. Washington, D.C.: U.S. Department of Agriculture, 1972. (DC/1).	Bulletin	440/70
	11. Purkhiser, E. Dale. Extension Bulletin E-885. Swine Production on Small Farms. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1975. (MI/3).	Bulletin	440

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
SELECTING LIVESTOCK OR POULTRY FOR THE FARM (cont.)	12. Blank, Graydon. Extension Bulletin E-843. Ewe Flock: Opportunity for Supplemental Income. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1975. (MI/3).	Bulletin	430/31
	13. Jordan, R.M. Extension Bulletin #351. Selecting Your Horse. St. Paul, Minnesota: Agricultural Extension Service, University of Minnesota, 1968. (MN/2).	Bulletin	460/31
	14. 4-H Bulletin 575A. 4-H Livestock Judging Guide. East Lansing, Michigan: Cooperative Extension Service, Michigan State University. (MI/3).	Bulletin	400/45
	15. Contact the local Cooperative Extension Service for additional information.		
SELECTING LIVESTOCK OR POULTRY HOUSING	1. Ensminger, M.E. Animal Science. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1969. (IL/7).	Book	400
	2. Swine Housing and Equipment Handbook. Ames, Iowa: Midwest Plan Service, Iowa State University, 1972. (MI/1).	Handbook	440/720
	3. Horse Housing and Equipment Handbook. Ames, Iowa: Midwest Plan Service, Iowa State University, 1971. (MI/1)	Handbook	460/720
	4. Dairy Housing and Equipment Handbook. Ames, Iowa: Midwest Plan Service, Iowa State University, 1971. (MI/1).	Handbook	410/720
	5. Beef Housing and Equipment Handbook. Ames, Iowa: Midwest Plan Service, Iowa State University, 1968. (MI/1).	Handbook	420/720
	6. Livestock Waste Facilities Handbook. Ames, Iowa: Midwest Plan Service, Iowa State University, 1975. (MI/1).	Handbook	400/27
	7. Contact the local Cooperative Extension Service for additional information.		

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
SELECTING BREEDING MATES	1. Lasley, John F. Genetics of Livestock Improvement. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1972. (NJ/1).	Book	400/55
	2. Roediger, Roger D. Livestock Breeding. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, 1976. (OH/2).	Book	400/30
	3. Animal Breeding Unit. Columbia, Missouri: Instructional Materials Laboratory, University of Missouri, 1971. (MO/2).	Pamphlet	400/30
	4. Ensminger, M.E. Animal Science. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1969. (IL/7).	Book	400
MANAGING MALE BREEDING ANIMALS	1. Ensminger, M.E. Animal Science. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1969. (IL/7).	Book	400
	2. Roediger, Roger D. Livestock Breeding. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, 1976. (OH/2).	Book	400/30
	3. Malone, Charles A. Source Unit in Animal Breeding. Ft. Collins, Colorado: Agricultural Education Section, Colorado State University, 1969. (CO/2).	Manual	400/30
	4. Cole, H.H. and Ronning, Magnar, ed. Animal Agriculture. San Francisco, California: W.H. Freeman and Company, 1974. (CA/3).	Book	400
	5. USDA Bulletin AB286. Beef Cattle Breeding. Washington, D.C.: U.S. Department of Agriculture, 1969. (DC/1).	Bulletin	420/30

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
HOUSING AND SANITATION FOR LIVESTOCK OR POULTRY	1. Ensminger, M.E. Animal Science. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1969. (IL/7).	Book	400
	2. Swine Housing and Equipment Handbook. Ames, Iowa: Midwest Plan Service, Iowa State University, 1972. (MI/1).	Handbook	440/720
	3. Horse Housing and Equipment Handbook. Ames, Iowa: Midwest Plan Service, Iowa State University, 1971. (MI/1).	Handbook	460/720
	4. Dairy Housing and Equipment Handbook. Ames, Iowa: Midwest Plan Service, Iowa State University, 1971. (MI/1).	Handbook	410/720
	5. Beef Housing and Equipment Handbook. Ames, Iowa: Midwest Plan Service, Iowa State University, 1968. (MI/1).	Handbook	420/720
	6. Cole, H.H. and Ronning, Magnar, ed. Animal Agriculture. San Francisco, California: W.H. Freeman and Company, 1974. (CA/3).	Book	400
	7. Livestock Waste Facilities Handbook. Ames, Iowa: Midwest Plan Service, Iowa State University, 1975. (MI/1).	Handbook	400/27
	8. Animal Waste Management Systems. Ames, Iowa: Iowa Association for Vocational Instructional Materials, Iowa State University. (IA/1).	Filmstrip	400/27
	9. Swine Facilities. Ames, Iowa: Iowa Association for Vocational Instructional Materials, Iowa State University. (IA/1).	Slide Set	440
PREPARING THE FEMALE FOR BREEDING	1. Ensiminger, M.E. Animal Science. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1969. (IL/7).	Book	400
	2. Roediger, Roger D. Livestock Breeding. Columbus, Ohio: Agricultural Education Curriculum Materials Service, 1976. (OH/2).	Book	400/30

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
PREPARING THE FEMALE FOR BREEDING (cont.)	3. Malone, Charles A. Source Unit In Animal Breeding. Ft. Collins, Colorado: Agricultural Education Section, Colorado State University, 1969. (CO/2).	Manual	400/30
	4. Cole, H.H. and Ronning, Magnar, ed. Animal Agriculture. San Francisco, California. W.H. Freeman and Company, 1974. (CA/3).	Book	400
	5. How Feeding and Management Affect A Sow's Reproduction. Ames, Iowa: Iowa Association for Vocational Instructional Materials, Iowa State University. (IA/1).	Slide Set	440
DETECTING PROPER TIME FOR BREEDING	1. Ensminger, M.E. Animal Science. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1969. (IL/7).	Book	400
	2. Roediger, Roger D. Livestock Breeding. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, 1976. (OH/2).	Book	400/30
	3. Malone, Charles A. Source Unit in Animal Breeding. Ft. Collins, Colorado: Agricultural Education Section, Colorado State University, 1969. (CO/2).	Manual	400/30
	4. Cole, H.H. and Ronning, Magnar, ed. Animal Agriculture. San Francisco, California: W.H. Freeman and Company, 1974. (CA/3).	Book	400
	5. USDA Bulletin AB286. Beef Cattle Breeding. Washington, D.C.: U.S. Department of Agriculture, 1969. (DC/1).	Bulletin	420/30
BREEDING LIVESTOCK ARTIFICIALLY	1. Ensminger, M.E. The Stockman's Handbook. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970. (IL/7).	Book	400

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
BREEDING LIVESTOCK ARTIFICIALLY (cont.)	2. Midwest Breeders Cooperative. AI: How to Make It Work for Beef Cattle. Shawano, Wisconsin: Midwest Breeders Cooperative, 1975. (WI/4).	Pamphlet	420/36
	3. Foley, Richard C., Bath, Donald L., Dickinson, Frank N., and Tucker, H. Allen. Dairy Cattle: Principles, Practices, Problems, Profits. Philadelphia, Pennsylvania: Lea and Febiger, 1972. (PA/3).	Book	410
	4. Artificial Insemination in Swine. Ames, Iowa: Iowa Association for Vocational Instructional Materials, Iowa State University. (IA/1).	Filmstrip	440/36
	5. Artificial Insemination in Beef Cattle. Ames, Iowa: Iowa Association for Vocational Instructional Materials, Iowa State University. (IA/1).	Filmstrip	420/36
THE DEVELOPING FETUS	1. Ensminger, M.E. The Stockman's Handbook. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970. (IL/7).	Book	400
	2. Ensminger, M.E. Animal Science. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1969. (IL/7).	Book	400
	3. Foley, Richard C., Bath, Donald L., Dickinson, Frank N., and Tucker, H. Allen. Dairy Cattle: Principles, Practices, Problems, Profits. Philadelphia, Pennsylvania: Lea and Febiger, 1972. (PA/3).	Book	410
	4. Cole, H.H. and Ronning, Magnar, ed. Animal Agriculture. San Francisco, California: W.H. Freeman and Company, 1974. (CA/3).	Book	400
	5. Advanced Livestock Production--Care and Management of Cow and Calf. Columbia, Missouri: Instructional Materials Laboratory, University of Missouri. (MO/3).	Manual	400/10

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
THE DEVELOPING FETUS (cont.)	6. Roediger, Roger D. Livestock Breeding. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, 1976. (OH/2).	Book	400/30
	7. Acker, Duane. Animal Science and Industry. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971. (NJ/1).	Book	400
CARING FOR FEMALE LIVESTOCK DURING GESTATION	1. Ensminger, M.E. The Stockman's Handbook. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970. (IL/7).	Book	400
	2. Ensminger, M.E. Animal Science. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1969. (IL/7).	Book	400
	3. Foley, Richard C., Bath, Donald L., Dickinson, Frank N., and Tucker, H. Allen. Dairy Cattle: Principles, Practices, Problems, Profits. Philadelphia, Pennsyvlania: Lea and Febiger, 1972. (PA/3).	Book	410
	4. Cole, H.H. and Ronning, Magnar, ed. Animal Agriculture. San Francisco, California: W.H. Freeman and Company, 1974. (CA/3).	Book	400
	5. Advanced Livestock Production--Care and Management of Cow and Calf. Columbia, Missouri: Instructional Materials Laboratory, University of Missouri. (MO/2).	Manual	400/10
	6. Roediger, Roger D. Livestock Breeding. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, 1976. (OH/2).	Book	400/30
	7. Acker, Duane. Animal Science and Industry. Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1971. (NJ/1).	Book	400

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
CARE AND MANAGEMENT OF FEMALE LIVESTOCK AND OFFSPRING DURING LABOR	1. Ensminger, M.E. The Stockman's Handbook. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970. (IL/7).	Book	400
	2. Ensminger, M.E. Animal Science. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1969. (IL/7).	Book	400
	3. Foley, Richard C., Bath, Donald L., Dickinson, Frank N., and Tucker, H. Allen. Dairy Cattle: Principles, Practices, Problems, Profits. Philadelphia, Pennsylvania: Lea and Febiger, 1972. (PA/3).	Book	410
	4. Cole, H.H. and Ronning, Magnar, ed. Animal Agriculture. San Francisco, California: W.H. Freeman and Company, 1974. (CA/3).	Book	400
	5. Advanced Livestock Production--Care and Management of Cow and Calf. Columbia, Missouri: Instructional Materials Laboratory, University of Missouri. (MO/2).	Manual	400/10
	6. Roediger, Roger D. Livestock Breeding. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, 1976. (OH/2)	Book	400/30
	7. Acker, Duane. Animal Science and Industry. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971. (NJ/1).	Book	400
REBREEDING LIVESTOCK	1. Ensminger, M.E. The Stockman's Handbook. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970. (IL/7).	Book	400
	2. Ensminger, M.E. Animal Science. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1969. (IL/7).	Book	400
	3. Foley, Richard C., Bath, Donald L., Dickinson, Frank N., and Tucker, H. Allen. Dairy Cattle: Principles, Practices, Problems, Profits. Philadelphia, Pennsylvania: Lea and Febiger, 1972. (PA/3).	Book	410

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
REBREEDING LIVESTOCK (cont.)	4. Cole, H.H. and Ronning, Magnar, ed. Animal Agriculture. San Francisco, California: W.H. Freeman and Company, 1974. (CA/3).	Book	400
	5. Advanced Livestock Production--Care and Management of Cow and Calf. Columbia, Missouri: Instructional Materials Laboratory, University of Missouri. (MO/2).	Manual	400/10
	6. Roediger, Roger D. Livestock Breeding. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, 1976. (OH/2).	Book	400/30
	7. Acker, Duane. Animal Science and Industry. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971. (NJ/1).	Book	400
DETERMINING LIVESTOCK OR POULTRY NUTRITIVE REQUIREMENTS	1. Ensminger, M.E. The Stockman's Handbook. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970. (IL/7).	Book	400
	2. Ensminger, M.E. Animal Science. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1969. (IL/7).	Book	400
	3. Foley, Richard C., Bath, Donald L., Dickinson, Frank N., and Tucker, H. Allen. Dairy Cattle: Principles, Practices, Problems, Profits. Philadelphia, Pennsylvania: Lea and Febiger, 1972. (PA/3)	Book	410
	4. Cole, H.H. and Ronning, Magnar, ed. Animal Agriculture. San Francisco, California: W.H. Freeman and Company, 1974. (CA/3).	Book	400
	5. Acker, Duane. Animal Science and Industry. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971. (NJ/1).	Book	400

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
THE FOOD NUTRIENT GROUPS AND THEIR FUNCTIONS IN THE BODIES OF LIVESTOCK OR POULTRY	1. Acker, Duane. Animal Science and Industry. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971. (NJ/1).	Book	400
	2. Frangon, R.D. Anatomy and Physiology of Farm Animals. Philadelphia, Pennsylvania: Lea and Febiger, 1971. (PA/3).	Book	400/07
	3. Jurgens, Marshall H. Applied Animal Feeding and Nutrition. Dubuque, Iowa: Kendall/Hunt Publishing Company, 1974. (IA/4).	Book	400/50
THE DIGESTION, ABSORPTION, AND METABOLISM OF FOOD IN LIVESTOCK OR POULTRY	1. Acker, Duane. Animal Science and Industry. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971. (NJ/1).	Book	400
	2. Frangon, R.D. Anatomy and Physiology of Farm Animals. Philadelphia, Pennsylvania: Lea and Febiger, 1971. (PA/3).	Book	400/07
	3. Jurgens, Marshall H. Applied Animal Feeding and Nutrition. Dubuque, Iowa: Kendall/Hunt Publishing Company, 1974. (IA/4).	Book	400/50
SELECTING FEEDS ACCORDING TO THEIR NUTRITIVE VALUES	1. Jurgens, Marshall H. Applied Animal Feeding and Nutrition. Dubuque, Iowa: Kendall/Hunt Publishing Company, 1972. (IA/4).	Book	400/50
	2. Cassard, Daniel W. and Juergenson, E.M. Approved Practices in Feeds and Feeding. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1971. (IL/7).	Book	400/60
	3. Perry, Tilden Wayne, Feed Formulations. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1975. (IL/7).	Book	400/52
	4. Cole, H.H. and Ronning, Magnar, ed. Animal Agriculture. San Francisco, California: W.H. Freeman and Company, 1974. (CA/3).	Book	400

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
BALANCING RATIONS FOR FARM ANIMALS	1. Ramsey, Harold A. Nutri-Rithmetic. Dubuque, Iowa: Kendall/Hunt Publishing Company, 1973. (IA/4).	Book	400/52
	2. Jurgers, Marshall H. Applied Animal Feeding and Nutrition. Dubuque, Iowa: Kendall/Hunt Publishing Company, 1974. (IA/4).	Book	400/50
	3. Ensminger, M.E. The Stockman's Handbook. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970. (IL/7).	Book	400
FEEDING FARM ANIMALS IN VARIOUS TYPES OF OPERATIONS	1. Hillman, D. et al. Extension Bulletin E-702. Basic Dairy Cattle Nutrition. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1975. (MI/3).	Bulletin	410/51
	2. Miller, E.D., Miller, E.R., and Ullrey, D.E. Extension Bulletin E-537. Nutrition: Swine Feeds and Feeding. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1975. (MI/3).	Bulletin	440/51
	3. Scott, George E. ed. The Sheepman's Production Handbook. Denver, Colorado: Abegg Printing, 1975. (CO/1).	Book	430
	4. Ensminger, M.E. The Stockman's Handbook. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970. (IL/7).	Book	400
	5. Diggins, Ronald V. and Bundy, Clarence E. Beef Production. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971. (NJ/1).	Book	420
IDENTIFYING AND SOLVING PROBLEMS RELATED TO NUTRITION	1. Hillman, D. et al. Extension Bulletin E-702. Basic Dairy Cattle Nutrition. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1975. (MI/3).	Bulletin	410/51

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MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
IDENTIFYING AND SOLVING PROBLEMS RELATED TO NUTRITION (cont.)	2. Miller, E.C., Miller, E.R., and Ullrey, D.E. Extension Bulletin E-537. Nutrition: Swine Feeds and Feeding. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1975. (MI/3).	Bulletin	440/51
	3. Scott, George E. ed. The Sheepman's Production Handbook. Denver, Colorado: Abegg Printing, 1975. (CO/1).	Book	430
	4. Ensminger, M.E. The Stockman's Handbook. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970. (IL/7).	Book	400
	5. Diggins, Ronald V. and Bundy, Clarence E. Beef Production. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971. (NJ/1).	Book	420
	6. Miller, E.C., Miller, E.R., and Ullrey, D.E. Extension Bulletin E-536. Nutrition: Introductory Animal Nutrition. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1975. (MI/3).	Bulletin	400/51
STORING AND HANDLING LIVESTOCK FEEDS	1. Foley, Richard C., Bath, Donald L., Dickinson, Frank N., and Tucker, H. Allen. Dairy Cattle: Principles, Practicies, Problems, Profits. Philadelphia, Pennsylvania: Lea and Febiger, 1972. (PA/3).	Book	410
	2. Heath, Maurice E., Metcalfe, Darrel S., and Barnes, Robert F. Forages: The Science of Grassland Agriculture. Ames, Iowa: Iowa State University Press, 1973. (IA/3)	Book	120
	3. Maddex, R.L. Extension Bulletin E-799. Drying and Storing Shelled Corn. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1975. (MI/3).	Bulletin	111/60
	4. Extension Bulletin E-798. Guidelines for Salvaging Drought--Stressed Corn. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1975. (MI/3).	Bulletin	111/60

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
STORING AND HANDLING LIVESTOCK FEEDS (cont.)	5. Aldrich, Samuel R., Scott Walter O., and Leng, Earl R. Modern Corn Production. Champaign, Illinois: A&L Publications, 1975. (IL/9).	Book	111
PREVENTING, DETECTING, AND CONTROLLING COMMON LIVESTOCK DISEASES	1. Blood, D.C. and Henderson, J.A. Veterinary Medicine. Balitmore, Maryland: The Williams and Wilkins Company, 1974. (MA/2).	Book	400/20
	2. Seiden, Rudolph. Livestock Health Encyclopedia. New York, New York: Springer Publishing Company, Inc., 1968. (NY/12).	Book	400/20
	3. Rossoff, Irving S. Handbook of Veterinary Drugs. New York, New York: Springer Publishing Company, Inc., 1974. (NY/12).	Book	400/20
	4. Scheid, Dan W. Livestock Veterinary Health Service. Ft. Atkinson, Wisconsin: The Highsmith Company, Inc., 1973. (WI/3).	Book	400/20
	5. Pig Stress and Pork Quality. Ames, Iowa: Iowa Association for Vocational Instructional Materials, Iowa State University. (IA/1).	Filmstrip	440/20
	6. Swine Arthritis. Ames, Iowa: Iowa Association for Vocational Instructional Materials, Iowa State University. (IA/1).	Filmstrip	440/20
	7. Animal Drugs: Their Use and You. Washington, D.C.: Animal Health Institute. (DC/2).	Filmstrip	400/20
	8. USDA Bulletin F2206. Foot Rot of Sheep. Washington, D.C.: U.S. Department of Agriculture, 1972. (DC/1).	Bulletin	430/20
	9. USDA Bulletin L451. Newcastle Disease in Poultry: How To Control It. Washington, D.C.: U.S. Department of Agriculture, 1968. (DC/1).	Bulletin	450/20

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
PREVENTING, DETECTING, AND CONTROLLING LIVESTOCK PARASITES	1. Ensminger, M.E. Animal Science. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1969. (IL/7).	Book	400
	2. Ensminger, M.E. The Stockman's Handbook. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970. (IL/7).	Book	400
	3. Scott, George E. ed. The Sheepman's Production Handbook. Denver, Colorado: Abegg Printing, 1975. (CO/1).	Book	430
	4. Diggins, Ronald V. and Bundy, Clarence E. Beef Production. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971. (NJ/1).	Book	420
	5. Bundy, Clarence E., Diggins, Ronald V., and Christensen, Virgil W. Swine Production. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971. (NJ/1).	Book	440
	6. Cattle Grub Control. Ames, Iowa: Iowa Association for Vocational Instructional Materials, Iowa State University. (IA/1).	Slide Set	400/20
	7. USDA Bulletin L456. Cattle Lice: How To Control Them. Washington, D.C.: U.S. Department of Agriculture, 1969. (DC/1).	Bulletin	400/20
	8. USDA Bulletin L527. How to Control Cattle Grub. Washington, D.C.: U.S. Department of Agriculture, 1972. (DC/1).	Bulletin	400/20
	9. USDA Bulletin L474. Chicken Lice: How To Control Them. Washington, D.C.: U.S. Department of Agriculture, 1971. (DC/1).	Bulletin	450/20
	10. USDA Bulletin L382. Fowl Tick: How To Control It. Washington, D.C.: U.S. Department of Agriculture, 1972. (DC/1).	Bulletin	450/20

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
PREVENTING, DETECTING, AND CONTROLLING LIVESTOCK PARASITES (cont.)	11. USDA Bulletin L2240. Preventing and Controlling Internal Parasites of Hogs. Washington, D.C.: U.S. Department of Agriculture, 1970. (DC/1).	Bulletin	440/20
	12. Cress, Donald C. Extension Bulletin E706. Controlling Insects and Mites in Livestock. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1973. (MI/3).	Bulletin	400/20
	13. Blank, Graydon, et al. Extension Bulletin E-479. Controlling Internal Parasites of Sheep. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1973. (MI/3).	Bulletin	430/20
DETECTING AND CONTROLLING ANIMAL HEALTH DISORDERS DUE TO POISONOUS PLANTS	1. Scott, George E., ed. The Sheepman's Production Handbook. Denver, Colorado: Abegg Printing, 1975. (CO/1).	Book	430
	2. Seiden, Rudolph. Livestock Health Encyclopedia. New York, New York: Springer Publishing Company, Inc., 1968. (NY/12).	Book	400/20
	3. Ensminger, M.E. The Stockman's Handbook. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970. (IL/7).	Book	400
	4. Diggins, Ronald V. and Bundy, Clarence E. Beef Production. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971. (NJ/1).	Book	420
	5. USDA Bulletin PRR137. Toxicity of 45 Organic Herbicides to Cattle, Sheep, and Chickens. Washington, D.C.: U.S. Department of Agriculture, 1972. (DC/1).	Bulletin	400/20

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
DETERMINING MOST FEASIBLE TIME TO MARKET LIVESTOCK	1. Agricultural Marketing Principles. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, 1972. (OH/2).	Book	840
	2. Doane's Farm Management Guide. St. Louis, Missouri: Doane Agricultural Service, Inc., 1973. (MO/3).	Book	810
	3. Doane's Facts and Figures for Farmers. St. Louis, Missouri: Doane Agricultural Service, Inc., 1972. (MO/3).	Book	810
DETERMING MARKET CLASSES AND GRADES OF LIVESTOCK	1. Meat Evaluation Handbook. Chicago, Illinois: National Livestock and Meat Board, 1976. (IL/11).	Book	400/84
	2. Hunsley, R.E., Beeson, W.M., and Nordby, Julius E. Livestock Judging and Evaluation. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970. (IL/7).	Book	400/45
	3. Forrest, John C., et al. Principles of Meat Science. San Francisco, California: W.H. Freeman and Company, 1975. (CA/3).	Book	400/80
	4. USDA Bulletin MB45. USDA Yield Grades for Beef. Washington, D.C.: U.S. Department of Agriculture, 1968. (DC/1).	Bulletin	420/84
SELECTING APPROPRIATE LIVESTOCK MARKET METHODS	1. Ensminger, M.E. The Stockman's Handbook. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970. (IL/7).	Book	400
	2. Ensminger, M.E. Animal Science. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1969. (IL/7).	Book	400
	3. Profit Marketing. St. Louis, Missouri: Doane Agricultural Service, Inc., 1975. (MO/3).	Book	840
	4. Cole, H.H. and Ronning, Magnar, ed. Animal Agriculture. San Francisco, California: W.H. Freeman and Company, 1974. (CA/3).	Book	400

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
SELECTING APPROPRIATE LIVESTOCK MARKETING METHODS (cont.)	5. Acker, Duane. Animal Science and Industry. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971. (NJ/1).	Book	400
PREPARING AND HANDLING LIVESTOCK FOR MARKETING	1. Ensminger, M.E. The Stockman's Handbook. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970. (IL/7).	Book	400
	2. Ensminger, M.E. Animal Science. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1969. (IL/7).	Book	400
	3. Foley, Richard C., Bath, Donald L., Dickinson, Frank N., and Tucker, H. Allen. Dairy Cattle: Principles, Practices, Problems, Profits. Philadelphia, Pennsylvania: Lea and Febiger, 1972. (PA/3).	Book	410
	4. Cole, H.H. and Ronning, Magnar, ed. Animal Agriculture. San Francisco, California: W.H. Freeman and Company, 1974. (CA/3).	Book	400
	5. Acker, Duane. Animal Science and Industry. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971. (NJ/1).	Book	400
MARKETING RAW MILK	1. Ensminger, M.E. Dairy Cattle Science. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1971. (IL/7).	Book	410
	2. Foley, Richard C., Bath, Donald L., Dickinson, Frank N., and Tucker, H. Allen. Dairy Cattle: Principles, Practices, Problems, Profits. Philadelphia, Pennsylvania: Lea and Febiger, 1972. (PA/3).	Book	410
	3. USDA Bulletin L408. Facts About Pasteurization of Milk. Washington, D.C.: U.S. Department of Agriculture, 1967. (DC/1).	Bulletin	410/81

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
MARKETING POULTRY AND EGGS	1. Ensminger, M.E. Poultry Science. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1971. (IL/7).	Book	450/840
	2. Cole, H.H. and Ronning, Magnar, ed. Animal Agriculture. San Francisco, California: W.H. Freeman Company, 1974. (CA/3).	Book	400
	3. Profit Marketing. St. Louis, Missouri: Doane Agricultural Service, Inc., 1975. (MO/3).	Book	840
	4. Egg Grading Manual. Agriculture Handbook No. 75. Washington, D.C.: Agricultural Marketing Service, U.S. Department of Agriculture, 1970. (DC/1).	Handbook	450/84
	5. USDA Bulletin L490. Caponizing Chickens. Washington, D.C.: U.S. Department of Agriculture, 1967. (DC/1).	Bulletin	450/26
	6. USDA Bulletin F2197. Farm Poultry Management. Washington, D.C.: U.S. Department of Agriculture, 1972. (DC/1).	Bulletin	450/10
CASTRATING, DEHORNING, IDENTIFYING, AND INJECTING LIVESTOCK	1. USDA Bulletin F2141. Dehorning, Castrating, Branding, and Marking. Washington, D.C.: U.S. Department of Agriculture, 1972. (DC/1).	Bulletin	400/26
	2. Scheid, Dan W. Livestock Veterinary Health Service. Ft. Atkinson, Wisconsin: The Highsmith Company, Inc., 1973. (WI/3).	Book	400/20
	3. Ensminger, M.E. The Stockman's Handbook. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970. (IL/7).	Book	400
DOCKING, SHEARING, TRIMMING FEET, AND WORMING SHEEP	1. Scott, George E., ed. The Sheepman's Production Handbook. Denver, Colorado: Abegg Printing, 1975. (CO/1).	Book	430

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
DOCKING, SHEARING, TRIMMING FEET, AND WORMING SHEEP (cont.)	2. Juergenson, Elwood M. Approved Practices in Sheep Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1972. (IL/7).	Book	430
	3. USDA Bulletin L551. Docking, Castrating, and Eartagging Lambs. Washington, D.C.: U.S. Department of Agriculture, 1969. (DC/1).	Bulletin	430/26
PREPARING FOR SHOW AND SHOWING LIVESTOCK	1. Ensminger, M.E. The Stockman's Handbook. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970. (IL/7).	Book	400
	2. Fitting and Showing Beef Cattle. East Lansing, Michigan: Animal Husbandry Department, Michigan State University. (MI/1).	Slide Set	420/47
	3. Fitting and Showing Dairy Cattle. San Luis Obispo, California: Vocational Education Productions, California Polytechnic State University. (MI/1).	Slide Set	410/47
	4. 4-H Bulletin 175.2C. Exhibition, Judging, and Evaluation. East Lansing, Michigan: Cooperative Extension Service, Michigan State University. (MI/5).	Bulletin	400/45
	5. 4-H Bulletin 145F. Dairy Showmanship. East Lansing, Michigan: Cooperative Extension Service, Michigan State University. (MI/5).	Bulletin	410/47
	6. 4-H Bulletin 545A. Fitting and Showing 4-H Dairy Animals. East Lansing, Michigan: Cooperative Extension Service, Michigan State University. (MI/5).	Bulletin	410/47
	7. 4-H Bulletin 375.3. A Guide for Exhibiting and Evaluating 4-H Sheep Projects. East Lansing, Michigan: Cooperative Extension Service, Michigan State University. (MI/5).	Bulletin	430/47
	8. 4-H Bulletin 575F. 4-H Meat Animal Showmanship. East Lansing, Michigan: Cooperative Extension Service, Michigan State University. (MI/5).	Bulletin	400/47

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
MILKING COWS	1. Jones, G.M. Managed Milking Guidelines. Blacksburg, Virginia: Extension Division, Virginia Polytechnic Institute and State University, 1975. (VA/2).	Pamphlet	410/80
	2. Ensminger, M.E. Dairy Cattle Science. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1971. (IL/7).	Book	410
	3. Foley, Richard C., Bath, Donald L., Dickinson, Frank N., and Tucker, H. Allen. Dairy Cattle: Principles, Practices, Problems, Profits. Philadelphia, Pennsylvania: Fea and Febiger, 1972. (PA/3).	Book	410
	4. USDA Bulletin F2111. Judging and Scoring Milk. Washington, D.C.: U.S. Department of Agriculture, 1968. (DC/1).	Bulletin	410/84
DISPOSING OF CROP AND ANIMAL WASTES TO PROTECT THE ENVIRONMENT	1. Ensminger, M.E. The Stockman's Handbook. Danville, Illinois: The Interstate Printers and Publishers, Inc. 1970. (IL/7).	Book	400
	2. Extension Bulletin E-372. Environmental Quality Legal Considerations for Michigan Livestock Producers. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1971. (MI/3).	Bulletin	400/27
	3. Extension Bulletin E-720. Livestock and Poultry Waste--Whose Responsibility. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1971. (MI/3).	Bulletin	400/27
	4. Livestock Waste Facilities Handbook. Ames, Iowa: Midwest Plan Service, Iowa State University, 1975. (MI/1).	Handbook	400/27
	5. Animal Waste Management Systems. Ames, Iowa: Iowa Association for Vocational Instructional Materials, Iowa State University. (IA/1).	Filmstrip	400/27

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
PLANNING THE CROPPING PROGRAM	1. Delorit, Richard J., Greub, Louis J., and Ahlgren, Henry L. Crop Production. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1974. (NJ/1).	Book	100
	2. Boone, Lester U., Richer, A. Chester, and Wilson, Harold K. Producing Farm Crops. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1975. (IL/7).	Book	100
	3. Planning the Cropping System. VAS 2003b. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	100/11
SELECTING A TILLAGE SYSTEM FOR SEED GERMINATION AND PLANT GROWTH	1. Minimum Tillage. VAS 4041. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	516
	2. Aldrich, Samuel R., Scott, Walter O., and Leng, Earl R. Modern Corn Production. Champaign, Illinois: A&L Publications, 1975. (IL/9).	Book	111/00
	3. Nelson, L.U., et al. Extension Bulletin E-904. No-Till Corn: 1 Guidelines. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1976. (MI/3)	Bulletin	516
	4. Boone, Lester U., Richer, A. Chester, and Wilson, Harold K. Producing Farm Crops. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1975. (IL/7).	Book	100
	5. Fridline, Clarence R. Tillage Systems. Columbus, Ohio: Ohio Agriculture Education Curriculum Materials Service. (OH/2).	Student Manual	516
OPERATING, ADJUSTING, SERVICING, AND STORING FARM TILLAGE EQUIPMENT	1. Tillage Systems for Corn. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, 1972. (OH/2).	Slide Set	111/516

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
OPERATING, ADJUSTING, SERVICING, AND STORING FARM TILLAGE EQUIPMENT (cont.)	2. Rader, Thomas, ed. Fundamentals of Machine Operation: Tillage. Moline, Illinois: John Deere and Company, 1976. (IL/1).	Book, slides are also available for this document.	516
	3. Rader, Thomas, ed. Fundamentals of Machine Operation: Agricultural Machinery Safety. Moline, Illinois: John Deere and Company, 1974. (IL/1)	Book, slides are also available for this document.	700
	4. See owner's manual for the specific piece of equipment you will be working with.		
DETERMINING FERTILITY NEEDS FOR FARM CROPS	1. Collecting and Preparing Soil Samples for Testing. VAS 4001. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	533
	2. Completing the Soil Fertility Plans. VAS 2015. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	533
	3. Aldrich, Samuel R., Scott, Walter O., and Leng, Earl R. Modern Corn Production. Champaign, Illinois: A&L Publications, 1975. (IL/9).	Book	111/00
	4. Boone, Lester U., Richer, A. Chester, and Wilson, Harold K. Producing Farm Crops. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1975. (IL/7).	Book	100
	5. Shickluna, J.C. Extension Bulletin E-498. Sampling Soils. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1975. (MI/3).	Bulletin	533
	6. Warncke, D.D. and Robertson, L.S. Extension Bulletin E-937. Understanding the MSU Soil Test Report. East Lansing, Michigan: Cooperative Extension Service, Michigan State University. (MI/3).	Bulletin	810
	7. Doane's Farm Management Guide. St. Louis, Missouri: Doane Agricultural Services, Inc., 1973. (MO/3).	Book, Teacher's Guide and Student Guide also available.	810

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
DETERMINING pH LEVEL AND LIMING NEEDS FOR CROPS TO BE GROWN	1. Balas, Michael A. and Baylar, John E. Haymaker's Handbook. New Holland, Pennsylvania: Sperry New Holland, 1975. (PA/2)	Book	120
	2. Nature of Soil Acidity and Major Plant Nutrients. VAS 4005. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	534
	3. pH Testing for Soil Acidity. VAS 4002a. Urbana, Illinois: Vocational Agriculture Service, university of Illinois. (IL/2).	Pamphlet	534
	4. Soil Liming--A Key to Better Farming. VAS 4006a. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	534
	5. Follett, Roy.H. Liming Acid Soils. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service. The Ohio State University, 1971. (OH/2)	Slide Set	534
	6. Christenson, D. and Doll, E.C. Extension Bulletin E-471. Lime for Michigan Soils. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1973. (MI/3).	Bulletin	534
SELECTING LIME AND FERTILIZER FOR AGRICULTURAL CROPS	1. Nature of Soil Acidity and Major Plant Nutrients. VAS 4005. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	534
	2. Soil Liming--A Key to Better Farming. VAS 4006a. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	534
	3. Using Phosphorus Fertilizers. VAS 4007. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	540
	4. Recommending Potassium Fertilizers. VAS 4008a. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	541

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
SELECTING LIME AND FERTILIZER FOR AGRICULTURAL CROPS (cont.)	5. Using Nitrogen Fertilizers. VAS 4009. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	540
	6. Planning The Nitrogen Program. VAS 4009a. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	540
	7. Aldrich, Samuel R., Scott, Walter O., and Leng, Earl R. Modern Corn Production. Champaign, Illinois: A&L Publications, 1975. (IL/9).	Book	111/00
	8. Christenson, D. and Doll, E.C. Extension Bulletin E-471. Lime for Michigan Soils. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1973. (MI/3).	Bulletin	534
OPERATING, ADJUSTING, SERVICING, AND STORING FARM FERTILIZER APPLICATION EQUIPMENT	1. Calibrating a Granular Applicator (#433). Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	743
	2. Rader, Thomas, ed. Fundamentals of Machine Operation: Agricultural Machinery Safety. Moline, Illinois: John Deere and Company, 1974. (IL/1).	Book, slides are also available for this document.	700
	3. Use the specific operator's manual for the type of equipment to be serviced.		
OPERATING, ADJUSTING, SERVICING AND STORING FARM PLANTING EQUIPMENT	1. Breece, H. Edward, Hansen, Harold V., and Hoerner, Thomas A. Fundamentals of Machine Operation: Planting. Moline, Illinois: John Deere and Company, 1975. (IL/1).	Book, slides are also available for this document.	742
	2. The Planter--Selection, Adjustment, Maintenance, and Use. VAS 3021. Urbana, Illinios: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	742

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
OPERATING, ADJUSTING, SERVICING, AND STORING FARM PLANTING EQUIPMENT (cont.)	3. Rader, Thomas, ed. Fundamentals of Machine Operation: Agricultural Machinery Safety. Moline, Illinois: John Deere and Company, 1974. (IL/1).	Book, slides are also available for this document.	700
	4. Use the specific operator's manual for the type of equipment to be used.		
PREPARING A WEED CONTROL PROGRAM IN GROWING CROPS	1. Controlling Weeds. VAS 4042. Urbana, Illinois: Vocational Agricultural Service, University of Illinois. (IL/2).	Pamphlet	641
	2. Steva, John L., and Ridenour, Harlan E. Weed Control --Cultural and Chemical. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, 1969. (OH/2).	Student Reference Manual, transparencies are also available.	641
	3. Boone, Lester U., Richer, A. Chester, and Wilson, Harold K. Producing Farm Crops. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1975. (IL/7).	Book	100
	4. Use current extension bulletins dealing with specific weed control practices.		
DETERMINING THE EFFECTS OF FERTILIZER CHEMICALS ON THE ECOLOGY	1. Courson, R.L. Nitrates in Water Supplies, Field Crops, and Ruminant Nutrition. VAS 4050. Urbana, Illinois: Vocational Agriculture Service, University of Illinois, 1970. (IL/2).	Pamphlet	540
	2. Contact the County Extension Office for information on this subject.		

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
OPERATING, ADJUSTING, SERVICING, AND STORING FARM CULTIVATION EQUIPMENT	1. See the specific operator's manual for the piece of equipment you are working with. 2. See the specific service and repair manual for the type of equipment you are working with.		
PREPARING AN INSECT AND DISEASE CONTROL PROGRAM FOR GROWING CROPS	1. Aldrich, Samuel R., Scott, Walter O., and Leng, Earl R. Modern Corn Production. Champaign, Illinois: A&L Publications, 1975. (IL/9).	Book	111/00
	2. Fridline, Clarence R. Insect Pests of Field Crops and Stored Grains. Columbus, Ohio: Ohio Agricultural Education, The Ohio State University, 1973. (OH/2).	Book	100/620
	3. Delorit, Richard J., Greub, Louis J., and Ahlgren, Henry L. Crop Production. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1974. (NJ/1).	Book	100
	4. Boone, Lester U., Richer, A. Chester, and Wilson, Harold K. Producing Farm Crops. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1975. (IL/7).	Book	100
	5. See the specific extension bulletin for the insect or disease you are working with.		
OPERATING, ADJUSTING, SERVICING, AND STORING FARM EQUIPMENT USED IN CONTROLLING WEEDS, INSECTS, AND OTHER PESTS	1. Rader, Thomas, ed. Fundamentals of Service: Mowing and Sprayer Equipment. Moline, Illinois: John Deere and Company, 1974. (IL/1).	Book, slides are also available for this document.	744
	2. Applying Pesticides. Athens, Georgia: American Association for Vocational Instructional Materials, 1976. (MI/1).	Book	606
	3. Calibrating Field Sprayers (#442). Urbana, Illinois: Vocational Agricultural Service, University of Illinois. (IL/2).	Filmstrip	744

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
OPERATING, ADJUSTING, SERVICING, AND STORING FARM EQUIPMENT USED IN CONTROLLING WEEDS, INSECTS, AND OTHER PESTS (cont.)	4. Field Sprayer Calibration (#503). Ames, Iowa: Iowa Association for Vocational Instructional Materials, Iowa State University. (IA/1).	Transparency Masters	744
HARVESTING FARM CROPS	1. Combines and Combining. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, 1970. (OH/2).	Pamphlet	745
	2. Corn Pickers and Picking Corn. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, 1970. (OH/2).	Pamphlet	745
	3. Delorit, Richard J., Greub, Louis J., and Ahlgren, Henry L. Crop Production. Englewood Cliffs, New Jersey: Prentice-Hall, Inc. 1974. (NJ/1).	Book	100
	4. Griffen, George A. Fundamentals of Machine Operation: Combine Harvesting. Moline, Illinois: John Deere and Company, 1973. (IL/1).	Book, slides are also available for this document.	745
	5. Use the specific service and repair manual for the type of equipment you are working with.		

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
DRYING FARM CROPS	1. Drying Corn on the Farm. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, 1970. OH/2).	Pamphlet	111/736
	2. Storing and Drying Farm Crops. VAS 4044. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	100/736
	3. Maddex, R.L. Extension Bulletin E-799. Drying and Storing Shelled Corn. East Lansing, Michigan: Coperative Extension Service, Michigan State Universtty, 1975. (MI/3).	Bulletin	111/736
	4. Publications are available from companies selling various types of drying equipment which outline the procedures involved in drying specific farm crops.		
HANDLING AND STORAGE OF FARM CROPS	1. Planning Grain-Feed Handling for Livestock and Cash-Grain Farms. Ames, Iowa: Midwest Plan Service, Iowa State Univesity, 1968. (MI/1).	Pamphlet	735
	2. Storing and Drying Farm Crops. VAS 4044. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2)	Pamphlet	100/736
	3. Maddex, R.L. Extension Bulletin E-799. Drying and Storing Shelled Corn. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1975. (MI/3).	Bulletin	111/736
	4. Materials from commerical companies dealing in grain bins, elevators, silos, and materials handling equipment can usually be obtained free of charge and these make good sources of technical content for this unit.		
GRADING FARM CROPS	1. Copeland, L.D. Grain Grading. East Lansing, Michigan: Michigan State University, (not available until the fall of 1977). (MI/3).	Laboratory manual, slide-tape will also be available for this docu ment.	100/47

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
GRADING FARM CROPS (cont.)	2. The Official United States Standards for Grain. Washington, D.C.: U.S. Department of Agriculture, 1975. (DC/1).	Pamphlet	111/47
	3. Determining Market Grades of Corn (#733). Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Filmstrip	111/47
	4. Factors Affecting Classes and Grades of Shelled Corn (#734). Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Filmstrip	111/47
	5. Factors Affecting Classes and Grades of Oats (#772). Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Filmstrip	113/47
	6. Factors Affecting Classes and Grades of Wheat (#776). Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Filmstrip	112/47
	7. Factors Affecting Classes and Grades of Soybeans (#746) Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Filmstrip	141/47
	8. See the USDA standards and grades for the specific farm crop you are working with.		
OPERATING HAY AND FORAGE EQUIPMENT	1. Rader, Thomas, ed. Fundamentals of Machine Operation: Agricultural Machinery Safety. Moline, Illinois: John Deere and Company, 1974. (IL/1).	Book, slides are also available for this document.	700
	2. Rader, Thomas, ed. Fundamentals of Machine Operation: Hay and Forage Harvesting. Moline, Illinois: John Deere and Company, 1976. (IL/1).	Book, slides are also available for this document.	745

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
OPERATING HAY AND FORAGE EQUIPMENT (cont.)	3. See the service and repair manual for the specific type of equipment you are working with. 4. See the owner's manual for the specific piece of equipment you are working with.		
OPERATING VARIOUS TYPES OF MACHINERY USED FOR HANDLING MATERIALS ON THE FARM	1. Rader, Thomas, ed. Fundamentals of Machine Operation: Agricultural Machinery Safety. Moline, Illinois: John Deere and Company, 1974. (IL/1). 2. See the operator's manual for the specific type of equipment you are operating.	Book, slides are also available for this document.	700

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
PLANNING AND ESTABLISHING A FARM SHOP OR SERVICE CENTER	1. Rader, Thomas, ed. Fundamentals of Service: Shop Tools. Moline, Illinois: John Deere and Company, 1973. (IL/1).	Book, slides are also available for this document.	782
	2. Colvin, Thomas S. Shop Planning. Athens, Georgia: American Association for Vocational Instructional Materials, 1975. (MI/1).	Book	781
	3. Phipps, Lloyd J. Mechanics in Agriculture. Danville, Illinois: Interstate Printers and Publishers, Inc., 1967. (IL/7).	Book	700
	4. Wakeman, T.J. and McCoy, Vernon L. The Farm Shop. New York, New York: MacMillan Company, 1960. (NY/8).	Book	780
	5. Planning and Equipping a Service Center for Your Farm. Ames, Iowa: Cooperative Extension Service, Iowa State University, 1972. (IA/2).	Bulletin	780
REPAIRING AND MAINTAINING HAND AND POWER TOOLS	1. Rader, Thomas, ed. Fundamentals of Service: Shop Tools. Moline, Illinois: John Deere and Company, 1973. (IL/1).	Book, slides are also available for this document.	782
	2. Phipps, Lloyd J. Mechanics in Agriculture. Danville, Illinois: Interstate Printers and Publishers, Inc., 1967. (IL/7).	Book	700
	3. Wakeman, T.J. and McCoy, Vernon L. The Farm Shop. New York, New York: The MacMillan Company, 1960. (NY/8).	Book	780
	4. Shopwork on the Farm. New York, New York: McGraw-Hill Book Company, 1970. (NY/2).	Book	780
	5. Sharpening Hand Tools. VAS 3005. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	782

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
WEARING SUITABLE CLOTHING AND OTHER PROTECTION DEVICES WHILE WORKING IN THE FARM SHOP	1. Burke, Jack. RAP Bulletin. Personal Protection Equipment for Agriculture. Chicago, Illinois: National Safety Council. (IL/6).	Bulletin	910/80
	2. Burke, Jack. RAP Bulletin. Respiratory Protection in Agriculture. Chicago, Illinois: National Safety Council. (IL/6).	Bulletin	910/80
	3. Burke, Jack. RAP Bulletin. Hearing Protection in Agriculture. Chicago, Illinois: National Safety Council. (IL/6).	Bulletin	910/80
OPERATING OXY-ACETYLENE WELDING EQUIPMENT	1. Althouse, Andrew D., Turnquist, Carl H., and Bowditch, William A. Modern Welding. South Holland, Illinois: Goodheart-Willcox Company, Inc., Publishers, 1970. (IL/3).	Book	785
	2. Phipps, Lloyd J. Mechanics in Agriculture. Interstate Printers and Publishers, Inc., 1967. (IL/7).	Book	700
	3. Rader, Thomas, ed. Fundamentals of Service: Welding. Moline, Illinois: John Deere and Company, 1974. (IL/3).	Book, slides are also available for this document.	785
	4. Wakeman, T.J. and McCoy, Vernon L. The Farm Shop. New York, New York: MacMillan Company, 1960. (NY/8).	Book	780
	5. Using the Oxy-acetylene Flame in Farm Construction and Repair. VAS 3001. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	785
	6. Arc and Oxy Welding.(#504). Ames, Iowa: Iowa Association for Vocational Instructional Materials, Iowa State University. (IA/1).	Transparency Masters	785

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
OPERATING ARC WELDING EQUIPMENT	1. Althouse, Andrew D., Turnquist, Carl H., and Bowditch, William A. Modern Welding. South Holland, Illinois: The Goodheart-Willcox Company, Inc., Publishers, 1970. (IL/3).	Book	785
	2. Phipps, Lloyd J. Mechanics in Agriculture. Danville, Illinois: Interstate Printers and Publishers, Inc., 1970. (IL/7).	Book	700
	3. Rader, Thomas, ed. Fundamentals of Service: Welding. Moline, Illinois: John Deere and Company, 1974. (IL/1).	Book, slides are also available for this document.	785
	4. Wakeman, T.J. and McCoy, Vernon L. The Farm Shop. New York, New York: MacMillan Company, 1960. (NY/8).	Book	780
	5. Using Carbon-Arc Torch. VAS 3029. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	785
	6. Arc Welding. VAS 3004. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	785
	7. Arc Welding (#450-64, #451-64, #450-64). Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Filmstrip(s)	785
	8. Arc and Oxy Welding (#504). Ames, Iowa: Iowa Association for Vocational Instructional Materials, Iowa State University. (IA/1).	Transparency Masters	785
PLUMBING	1. Phipps, Lloyd J. Mechanics in Agriculture. Danville, Illinois: Interstate Printers and Publishers, Inc., 1967. (IL/7).	Book	700

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
PLUMBING (cont.)	2. Wakeman, T.J. and McCoy, Vernon L. The Farm Shop. New York, New York: The MacMillan Company, 1960. (NY/8).	Book	780
	3. Planning for an Individual Water System. Athens, Georgia: American Association for Vocational Instructional Materials, 1973. (MI/1).	Book	750
	4. USDA Bulletin F2213. Plumbing for the Home and Farmstead. Washington, D.C.: United States Department of Agriculture, 1970. (DC/1).	Bulletin	716
	5. USDA Bulletin F2202. Simple Plumbing Repairs for the Home and Farmstead. Washington, D.C.: U.S. Department of Agriculture, 1972. (DC/1).	Bulletin	716
PAINTING FARM BUILDINGS	1. Phipps, Lloyd J. Mechanics in Agriculture. Danville, Illinois: Interstate Printers and Publishers, Inc., 1967. (IL/7).	Book	700
	2. Wakeman, T.J. and McCoy, Vernon L. The Farm Shop. New York, New York: The MacMillan Company, 1960. (NY/8).	Book	780
	3. Spray Painting. VAS 3015. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	784
	4. USDA Bulletin G155. Exterior Painting. Washington, D.C.: United States Department of Agriculture, 1968. (DC/1).	Bulletin	784
	5. Companies dealing in paints and painting equipment have promotional materials that can be quite useful when studying this module topic.		
PLANNING FARMSTEAD BUILDINGS	1. Phipps, Lloyd J. Mechanics in Agriculture. Danville, Illinois: Interstate Printers and Publishers, Inc., 1967. (IL/7).	Book	700

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
PLANNING FARMSTEAD BUILDINGS (cont.)	2. Colvin, Thomas S. Utility Buildings: Designs, Materials, Plans. Athens, Georgia: American Association of Vocational Instructional Materials, 1969. (MI/1). 3. Companies dealing with farm buildings and structures have promotional materials that can be quite useful when studying various building types for utility and cost.	Book	710
USING CONSTRUCTION PLANS AND BLUEPRINTS	1. USDA Bulletin F1869. Foundations for Farm Building . Washington, D.C.: U.S. Department of Agriculture, 1970. (DC/1). 2. USDA Bulletin F2170. Roofing Farm Buildings. Washington, D.C.: U.S. Department of Agriculture, 1973. (DC/1). 3. Selecting Lumber and Other Building Materials. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2). 4. Use of the Square in Farm Construction. VAS 3009. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Bulletin Bulletin Pamphlet Pamphlet	710 710 710 782
SELECTING LUMBER, HARDWARE, AND OTHER BUILDING MATERIALS	1. Phipps, Lloyd J. Mechanics in Agriculture. Danville, Illinois: Interstate Printers and Publishers, Inc., 1967. (IL/7). 2. Wakeman, T.J. and McCoy, Vernon L. The Farm Shop. New York, New York: The MacMillan Company, 1960. (NY/8). 3. Wagner, Willis H. Modern Carpentry. South Holland, Illinois: The Goodheart-Willcox Company, Inc., 1973. (IL/3).	Book Book Book	700 780 780

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
SELECTING LUMBER, HARDWARE, AND OTHER BUILDING MATERIALS (cont.)	4. Shopwork on the Farm. New York, New York: McGraw-Hill Book Company, 1970. (NY/2).	Book	780
	5. Selecting Lumber and Other Building Materials. VAS 3006. Urbana, Illinois: Vocational Agricultural Service, University of Illinois. (IL/2).	Pamphlet	710
	6. USDA Bulletin AB311. Selection and Use of Wood Products for Home and Farm Buildings. Washington, D.C.: U.S. Department of Agriculture, 1972. (DC/1).	Bulletin	710
PREPARING BUILDING SITES AND FOUNDATIONS	1. Durbahn, Walter E. and Sundberg, Elmer W. Fundamentals of Carpentry Vol. 2--Practical Construction. Chicago, Illinois: American Technical Society, 1975. (IL/4).	Book	780
	2. Wagner, Willis H. Modern Carpentry. South Holland, Illinois: The Goodheart-Willcox Company, Inc., 1973. (IL/3).	Book	780
	3. Phipps, Lloyd J. Mechanics in Agriculture. Danville, Illinois: Interstate Printers and Publishers, Inc., 1967. (IL/7).	Book	700
	4. Toennies, Henry. Concrete Masonry. Arlington, Virginia: National Concrete Masonry Association, 1973. (VA/1).	Instructor's guide, student manual, and a student study guide are available.	715
	5. USDA Bulletin F1869. Foundations for Farm Buildings. Washington, D.C.: U.S. Department of Agriculture, 1970. (DC/1).	Bulletin	710
	6. USDA Bulletin AB320. Know the Soil You Build On. Washington, D.C.: U.S. Department of Agriculture, 1967. (DC/1).	Bulletin	711/500

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
CONSTRUCTING FARM BUILDINGS	1. Phipps, Lloyd J. Mechanics in Agriculture. Danville, Illinois: Interstate Printers and Publishers, Inc., 1967. (IL/7).	Book	700
	2. Wakeman, T.J. and McCoy, Vernon L. The Farm Shop. New York, New York: The MacMillan Company, 1960. (NY/8).	Book	780
	3. Applying Asphalt Roofing and Siding Products. VAS 3035. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	710
	4. Use of the Square in Farm Construction. VAS 3009. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	710
	5. Resource Unit on Construction and Maintenance Skills for Core Curriculum. Tucson, Arizona: Department of Agriculture Education, University of Arizona, 1970. (AZ/1).	Book	710
	6. USDA Bulletin F2170. Roofing Farm Buildings. Washington, D.C.: U.S. Department of Agriculture, 1973. (DC/1).	Bulletin	710
USING CONCRETE ON THE FARM	1. Wakeman, T.J. and McCoy, Vernon L. The Farm Shop. New York, New York: The Macmillan Company, 1960. (NY/8).	Book	780
	2. Phipps, Lloyd J. Mechanics in Agriculture. Danville, Illinois: Interstate Printers and Publishers, Inc., 1967. (IL/7).	Book	700
	3. Jacobs, Clinton O. How to Construct Quality Concrete. Tucson, Arizona: Department of Agriculture Education, University of Arizona, 1971. (AZ/1).	Book	715
	4. Hoerner, T.A. and Bear, W.F. Quality Concrete Construction. St. Paul, Minnesota: Hobar Publications, 1971. (MN/1).	Teachers Guide	715

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
USING CONCRETE ON THE FARM (cont.)	5. Troweling Tips and Techniques. Marshalltown, Iowa: Marshalltown Trowel Company. (MI/1).	Pamphlet	715
	6. Quality Concrete. St. Paul, Minnesota: Hobar Publications. (MN/1).	Transparency Masters	715
	7. Making and Using Concrete on the Farm. VAS 3007. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	715
	8. How to Construct Quality Concrete. Tucson, Arizona: Agricultural Education Department, University of Arizona, 1972. (AZ/1).	Book	715
CONSTRUCTING AND MAINTAINING FARM FENCES	1. Planning Farm Fences. Athens, Georgia: American Association for Vocational Instructional Materials, 1966. (MI/1).	Book	724
	2. Turner, J. Howard, ed. Building Fences. Athens, Georgia: American Association for Vocational Instructional Materials, 1974. (MI/1).	Book	724
	3. Phipps, Lloyd J. Mechanics in Agriculture. Danville, Illinois: Interstate Printers and Publishers, Inc., 1967. (IL/7).	Book	700
	4. Ensminger, M.E. The Stockman's Handbook. Danville, Illinois: Interstate Printers and Publishers, Inc., 1970. (IL/7).	Book	400
	5. USDA Bulletin F2247. Fences for the Farm and Rural Home. Washington, D.C.: U.S. Department of Agriculture, 1971. (DC/1).	Bulletin	724

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
OPERATING AND CARING FOR SMALL GASOLINE ENGINES	1. Turner, J. Howard Small Engines Vol. I--Care and Operation. Athens, Georgia: American Association for Vocational Instructional Materials, 1975. (MI/1).	Book, slides and transparency masters are also available for this document.	761
	2. Hoerner, Thomas, et al. Small Gasoline Engines--Operation and Maintenance. St. Paul, Minnesota: Hobar Publications, 1973. (MN/1).	Book	761
	3. See operator's manual for type of engine being used.		
MAINTAINING SMALL GASOLINE ENGINES	1. Turner, J. Howard. Small Engines Vol II.--Maintenance and Repair. Athens, Georgia: American Association for Vocational Instructional Materials, 1971. (MI/1).	Book, slides and transparency masters are also available for this document.	761
	2. Small Engines Service Manual. St. Paul, Minnesota: Hobar Publications, 1973. (MN/1).	Book	761
	3. Carburetor Laboratory. St. Paul, Minnesota: Hobar Publications, 1973. (MN/1).	Slide Set	761
	4. Small Engine Disassembly and Assembly Laboratory. St. Paul, Minnesota: Hobar Publications, 1975. (MN/1).	Slide Set	761
	5. Magneto Ignition Laboratory. St. Paul, Minnesota: Hobar Publications. (MN/1).	Slide Set	761
	6. Magneto Ignition Systems. St. Paul, Minnesota: Hobar Publications, 1973. (MN/1).	Slide Set	761
	7. Hoerner, Thomas et al. Small Gasoline Engines--Operation and Maintenance. St. Paul, Minnesota: Hobar Publications, 1973. (MN/1).	Book	761
	8. Pipe, Ted. Small Gasoline Engines. Indianapolis, Indiana: Bobbs-Merrill Company, Inc., 1975. (IN/1).	Book	761

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
MAINTAINING SMALL GASOLINE ENGINES (cont.)	9. Small Engines--Repair and Overhaul. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	761
SERVICING THE BATTERY	1. Parady, W. Harold, and Turner, J. Howard. Tractor Maintenance: Principles and Procedures. Athens, Georgia: American Association for Vocational Instructional Materials, 1975. (MI/1).	Book, slides are also available for this document.	787
	2. Rader, Thomas, ed. Fundamentals of Service: Electrical Systems. Moline, Illinois: John Deere and Company, 1972. (IL/1).	Book, slides and transparency masters are also available for this document.	787
	3. Rader, Thomas, ed. Fundamentals of Machine Operation: Preventive Maintenance. Moline, Illinois: John Deere and Company, 1973. (IL/1).	Book, slides are also available for this document.	787
SERVICING THE ELECTRICAL SYSTEM	1. Rader, Thomas, ed. Fundamentals of Service: Electrical Systems. Moline, Illinois: John Deere and Company, 1972. (IL/1).	Book, slides and transparency masters are also available for this document.	787
	2. Borgman, Donald E., Hainline, Everette, and Long, Melvin E. Fundamentals of Machine Operation: Tractors. Moline, Illinois: John Deere and Company, 1974. (IL/1).	Book, slides are also availble for this document.	762
	3. Parady, W. Harold and Turner, J. Howard. Tractor Maintenance Principles and Procedures. Athens, Georgia: American Association for Vocational Instructional Materials, 1975. (MI/1).	Book, slides are also available for this document.	787

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
SERVICING THE ELECTRICAL SYSTEM (cont.)	4. Hathaway, Louis. Fundamentals of Machine Operation: Preventive Maintenance. Moline, Illinois: John Deere and Company, 1973. (IL/1).	Book, slides are also available for this document.	787
	5. Farm and Industrial Equipment Institute. The Tractor Electrical System. Athens, Georgia: American Association for Vocational Instructional Materials. (MI/1).	Book	787
REMOVING AND REPLACING THE STARTER	1. Parady, W. Harold and Turner, J. Howard. Tractor Maintenance Principles and Procedures. Athens, Georiga: American Association for Vocational Instructional Materials, 1975. (MI/1).	Book, slides are also available for this document.	787
	2. Rader, Thomas, ed. Fundamentals of Machine Operation: Preventive Maintenance. Moline, Illinois: John Deere and Company, 1973. (IL/1).	Book, slides are also available for this document.	787
	3. Check the specific maintenance and service manual for the type of equipment you are working with.		
SERVICING THE COOLING SYSTEM	1. Parady, W. Harold and Turner, J. Howard. Tractor Maintenance Principles and Procedures. Athens, Georgia: American Association for Vocational Instructional Materials, 1975. (MI/1).	Book, slides are also available for this document.	787
	2. Rader, Thomas, ed. Fundamentals of Service: Engines. Moline, Illinois: John Deere and Company, 1972. (IL/1).	Book, slides and transparency masters are also available for this document.	787
	3. Hathaway, Louis, Fundamentals of Machine Operation: Preventive Maintenance. Moline, Illinois: John Deere and Company, 1973. (IL/1).	Book, slides are also available for this document.	787

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
SERVICING THE COOLING SYSTEM (cont.)	4. Promersberger, William J., Bishop, Frank E., and Priebe, Donald W. Modern Farm Power. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971. (NJ/1).	Book	787
	5. The Engine Cooling System. VAS 3030. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	787
	6. Use specific service and repair manual for the type of tractor being serviced.		
LUBRICATING THE FARM TRACTOR AND SERVICING THE AIR CLEANER	1. Rader, Thomas, ed. Fundamentals of Service: Engines. Moline, Illinois: John Deere and Company, 1972. (IL/1).	Book, slides and transparency masters are also available for this document.	787
	2. Hathaway, Louis. Fundamentals of Machine Operation: Preventive Maintenance. Moline, Illinois: John Deere and Company, 1973. (IL/1).	Book, slides are also available for this document.	787
	3. Borgman, Donald E., Hainline, Everette, and Long, Melvin E. Fundamentals of Machine Operation: Tractors. John Deere and Company, 1974. (IL/1).	Book, slides are also available for this document.	762
	4. Parady, W. Harold and Turner, J. Howard. Tractor Maintenance Principles and Procedures. Athens, Georgia: American Association for Vocational Instructional Materials, 1975. (MI/1).	Book, sldies are also available for this document.	787
	5. Promersberger, William J., Bishop, Frank E., and Priebe, Donald W. Modern Farm Power. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971. (NJ/1).	Book	787
	6. Use the specific service manual for the type of tractor being serviced.		

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
CHECKING AND REPLACING TRANSMISSION FLUID	1. Farm and Industrial Equipment Institute. Tractor Transmissions. Athens, Georgia: American Association for Vocational Instructional Materials. (MI/1).	Book	787
	2. Hathaway, Louis. Fundamentals of Machine Operation: Preventive Maintenance. Moline, Illinois: John Deere and Company, 1973. (IL/1).	Book, slides are also available for this document.	787
	3. Parady, W. Harold and Turner, J. Howard. Tractor Maintenance Principles and Procedures. Athens, Georgia: American Association for Vocational Instructional Materials, 1975. (MI/1).	Book, slides are also available for this document.	787
	4. Use the specific service manual for the type of tractor being serviced.		
CHECKING AND SERVICING BRAKES	1. Hathaway, Louis. Fundamentals of Machine Operation: Preventive Maintenance. Moline, Illinois: John Deere and Company, 1973. (IL/1).	Book, slides are also available for this document.	787
	2. Parady, W. Harold and Turner, J. Howard. Tractor Maintenance Principles and Procedures. Athens, Georgia: American Association for Vocational Instructional Materials, 1975. (MI/1).	Book, slides are also available for this document.	787
	3. Borgman, Donald E., Hainline, Everette, and Long, Melvin E. Fundamentals of Machine Operation: Tractors. Moline, Illinois: John Deere and Company, 1974. (IL/1).	Book, slides are also available for this document.	762
	4. Parady, W. Harold and Turner, J. Howard. Tractor Maintenance Principles and Procedures. Athens, Georgia: American Association for Vocational Instructional materials, 1975. (MI/1).	Book, slides are also available for this document.	787
	5. Check the operator's manual for the type of equipment being used.		

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
CHECKING AND SERVICING THE HYDRAULIC LIFT AND/OR THE HYDRAULIC SYSTEM OF OTHER FARM MACHINES	1. Rader, Thomas, ed. Fundamentals of Service: Hydraulics. Moline, Illinois: John Deere and Company, 1972. (IL/1).	Book, slides and transparency masters are also available for this document.	787
	2. Turner, J. Howard and Wren, James E. Hydraulic Systems for Tractors and Other Mobile Equipment Vol. I--Care and Operation. Athens, Georgia: American Association for Vocational Instructional Materials, 1974. (MI/1).	Book	787
	3. Turner, J. Howard and Wren, James E. Hydraulic Systems for Tractors and Other Mobile Equipment Vol. II--Inspection and Testing. Athens, Georgia: American Association for Vocational Instructional Materials, 1974. (MI/1).	Book	787
	4. Hathaway, Louis: Fundamentals of Machine Operation: Preventive Maintenance. Moline, Illinois: John Deere and Company, 1974. (IL/1).	Book, slides are also available for this document.	787
CHECKING AND INFLATING TIRES	1. Rader, Thomas, ed. Fundamentals of Service: Tires and Tracks. Moline, Illinois: John Deere and Company, 1974. (IL/1).	Book, slides are also available for this document.	787
	2. Tires for Farm Equipment. VAS 3031. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	787
TRANSMITTING POWER VIA BELTS AND PULLEYS	1. Phipps, Lloyd J. Mechanics in Agriculture. Danville, Illinois: Interstate Printers and Publishers, Inc., 1967. (IL/7).	Book	700

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
TRANSMITTING POWER VIA BELTS AND PULLEYS (cont.)	2. Rader, Thomas, ed. Fundamentals of Service: Power Trains. Moline, Illinois: John Deere and Company, 1972. (IL/1).	Book, slides and transparency masters are also available for this document.	787
	3. Rader, Thomas, ed. Fundamentals of Service: Belts and Chains. Moline, Illinois: John Deere and Company, 1974. (IL/1).	Book, slides are also available for this document.	787
PLANNING USE OF ELECTRICITY FOR HEATING, COOLING, AND/OR MATERIALS HANDLING	1. Electrical Wiring--Fundamentals and Planning. VAS 3003b. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	776
	2. Phipps, Lloyd J. Mechanics in Agriculture. Danville, Illinois: Interstate Printers and Publishers, Inc., 1967. (IL/7).	Book	700
IDENTIFYING AND REPLACING DEFECTIVE PARTS IN FARM MACHINES	1. Rader, Thomas, ed. Fundamentals of Machine Operation: Preventive Maintenance. Moline, Illinois: John Deere and Company, 1973. (IL/1).	Book, slides are also available for this document.	787
	2. Rader, Thomas, ed. Fundamentals of Machine Operation: Tractors. Moline, Illinois: John Deere and Company, 1974. (IL/1).	Book, slides are also available for this document.	782
OPERATING FARM TRUCKS IN TRANSPORTING AGRICULTURAL MACHINERY AND COMMODITIES	1. Phipps, Lloyd J. Mechanics in Agriculture. Danville, Illinois: Interstate Printers and Publishers, Inc., 1967. (IL/7).	Book	700

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
OPERATING FARM TRUCKS IN TRANSPORTING AGRICULTURAL MACHINERY AND COMMODITIES (cont.)	2. Borgman, Donald E., Hainline, Everette, and Long, Melvin E. Fundamentals of Machine Operation: Tractors. Moline, Illinois: John Deere and Company, 1974. (IL/1).	Book, slides are also available for this document.	762
	3. For additional references consult the owner's manual for the type of equipment you are going to operate or transport.		
USING SAFETY PRACTICES IN OPERATING FARM MACHINERY	1. Borgman, Donald E., Hainline, Everette, and Long, Melvin E. Fundamentals of Machine Operation: Tractors. Moline, Illinois: John Deere and Company, 1974. (IL/1).	Book, slides are also available for this document.	762
	2. Bittner, Richard H., et al. Fundamentals of Machine Operation: Agricultural Machinery Safety. Moline, Illinois: John Deere and Company, 1974. (IL/1).	Book, slides are also available for this document.	760
	3. Operating Farm Tractors and Machinery. St. Paul, Minnesota: Hobar Publications. (MN/1).	Transparencies	760
	4. Silletto, T.A. and Hull, Dale O. Safe Operation of Agricultural Equipment. St. Paul, Minnesota: Hobar Publications, 1975. (MN/1).	Book	760
	5. Burke, Jack. RAP Bulletin. Safe Tractor Operation. Chicago, Illinois: National Safety Council. (IL/6).	Bulletin	760
	6. Burke, Jack, Fletcher, William J., and Hanford, William D. RAP Bulletin. Safe Movement of Farm Equipment on Public Roads. Chicago, Illinois: National Safety Council. (IL/6).	Bulletin	760
	7. Promersberger, William J., Bishop, Frank E., and Priebe, Donald W. Modern Farm Power. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971. (NJ/1).	Book	787

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
REPAIRING FARM BUILDINGS	1. Phipps, Lloyd J. Mechanics in Agriculture. Danville, Illinois: Interstate Printers and Publishers, Inc., 1967. (IL/7).	Book	700
	2. USDA Bulletin F2170. Roofing Farm Buildings. Washington, D.C.: U.S. Department of Agriculture, 1975. (DC/1).	Bulletin	710
	3. USDA Bulletin F2203. Use of Concrete on the Farm. Washington, D.C.: U.S. Department of Agriculture, 1973. (DC/1).	Bulletin	715
DETERMINING LAND USE CAPABILITY	1. Mokma, D.L., Dersch, E., and Schaner, D.J. Extension Bulletin E-326. A Guide for Land Judging in Michigan. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1975. (MI/3).	Bulletin	525
	2. Agriculture Handbook No. 210. Land Capability Classification. Washington, D.C.: Soil Conservation Service, U.S. Department of Agriculture, 1973. (DC/1).	Bulletin	512
	3. Know Your Land. Washington, D.C.: U.S. Department of Agriculture. (MI/1).	Slide Set	524
DETERMINING WATER HOLDING CAPACITY OF THE SOIL	1. Pair, Claude H., et al. Sprinkler Irrigation. Silver Springs, Maryland: Sprinkler Irrigation Association, 1975. (MA/1).	Book	753
	2. Foth, H.D. and Turk, L.M. Fundamentals of Soil Science. New York, New York: John Wiley and Sons, Inc., 1972. (NY/13).	Book	500
DETERMINING THE FEASIBILITY OF IRRIGATION	1. Turner, J. Howard and Anderson, Carl L. Planning for an Irrigation System. Athens, Georgia: American Association for Vocational Instructional Materials, 1971. (MI/1).	Book, slides are also available for this document.	753

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
DETERMINING THE FEASIBILITY OF IRRIGATION (cont.)	2. Phipps, Lloyd J. Mechanics in Agriculture. Danville, Illinois: Interstate Printers and Publishers, Inc., 1967. (IL/7).	Book	700
	3. Pair, Claude H., et al. Sprinkler Irrigation. Silver Springs, Maryland: Sprinkler Irrigation Association, 1975. (MA/1).	Book	753
	4. Foth, H.E. and Turk, L.M. Fundamentals of Soil Science. New York, New York: John Wiley and Sons, Inc., 1972. (NY/13).	Book	500
	5. Glass, L. Joe. Irrigation. San Luis Obispo, California: Vocational Education Productions, 1976. (CA/1).	Filmstrip	753
PLANNING A SPRINKLER IRRIGATION SYSTEM	1. Turner, Howard J. and Anderson, Carl L. Planning for an Irrigation System. Athens, Georgia: American Association for Vocational Instructional Materials, 1971. (MI/1).	Book, slides are also available for this document.	753
	2. Phipps, Lloyd J. Mechanics in Agriculture. Danville, Illinois: Interstate Printers and Publishers, Inc., 1967. (IL/7).	Book	700
	3. Pair, Claude, H., et al. Sprinkler Irrigation. Silver Springs, Maryland: Sprinkler Irrigation Association, 1975. (MA/1).	Book	753
	4. USDA Bulletin L476. Sprinkler Irrigation. Washington, D.C. U.S. Deparmment of Agriculture, 1967. (DC/1).	Bulletin	753
	5. Glass, L. Joe. Irrigation. San Luis Obispo, California: Vocational Education Production, 1976. (CA/1).	Filmstrip	753

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
DETERMINING IRRIGATION COST AND RETURN ON INVESTMENT	1. Pair, Claude H., et al. Sprinkler Irrigation. Silver Springs, Maryland: Sprinkler Irrigation Association, 1975. (MA/1).	Book	753
	2. Turner, J. Howard and Anderson, Carl L. Planning for an Irrigation System. Athens, Georgia: American Association for Vocational Instructional Materials, 1971. (MI/1).	Book, slides are also available for this document.	753
ELECTRICAL POWER--ITS NATURE AND MEASUREMENT	1. Phipps, Lloyd J. Mechanics in Agriculture. Danville, Illinois: Interstate Printers and Publishers, Inc., 1967. (IL/7).	Book	700
	2. Turner, J. Howard. Understanding Electricity and Electrical Terms. Athens, Georgia: American Association for Vocational Instructional Materials, 1974. (MI/1).	Book, slides and transparency masters are also available for this document.	770
	3. Roediger, Roger D. Electrical Power--Its Nature and Measurement. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, 1974. (OH/2).	Book	770
	4. McKenzie, Bruce A. and Zachariah, Gerald L. Understanding and Using Electricity. Danville, Illinois: Interstate Printers and Publishers, Inc., 1975. (IL/7).	Book	770
	5. Richter, H.P. Wiring Simplified. Minneapolis, Minnesota: Park Publishing, Inc., 1974. (IL/7).	Book	772
SELECTING AND USING CONDUCTORS	1. Middletown, Robert G. Practical Electricity. Indianapolis, Indiana: Bobbs-Merrill Company, Inc., 1975. (IN/1).	Book	770

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
SELECTING AND USING CONDUCTORS (cont.)	2. Turner, J. Howard. Understanding Electricity and Electrical Terms. Athens, Georgia: American Association for Vocational Instructional Materials, 1974. (MI/1).	Book, slides and transparency masters are also available for this document	770
	3. Kowalka, Ronald C. Conductors Insulation and Their Use. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, 1974. (OH/2).	Book	770
	4. Jones, E.W. and Johnson, J.L. Adequate Wiring for Home and Farm. New York, New York: Bruce Publishing Company, 1963. (NY/9).	Book	772
	5. Agricultural Wiring Handbook. New York, New York: Agricultural Marketing Division, Edison Electric Institute, 1971. (NY/10).	Book	772
	6. Richter, H.P. Wiring Simplified. Minneapolis, Minnesota: Park Publishing, Inc., 1974. (MN/1).	Book	772
PERFORMING SIMPLE WIRING TASKS ON THE FARM	1. Wakeman, T.J. and McCoy, Vernon L. The Farm Shop. New York, New York: The Macmillan Company, 1960. (NY/8).	Book	780
	2. Phipps, Lloyd J. Mechanics in Agriculture. Danville, Illinois: Interstate Printers and Publishers, Inc., 1967. (IL/7).	Book	700
	3. Farm Electricity. St. Paul, Minnesota: Hobar Publications, 1968. (MN/1).	Teacher Reference	770
	4. Maintaining the Lighting and Wiring System. Athens, Georgia: American Association for Vocational Instructional Materials, 1974. (MI/1).	Book, slides and transparency are also available for this document.	772
	5. Jones, E.W. and Johnson, J.L. Adequate Wiring for Home and Farm. New York, New York: Bruce Publishing Company, 1963. (NY/9).	Book	772

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
PERFORMING SIMPLE WIRING TASKS ON THE FARM (cont.)	6. Electrical Wiring Procedures. VAS 3016a. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	772
	7. McKenzie, Bruce A. and Zachariah, Gerald L. Understanding and Using Electricity. Danville, Illinois: Interstate Printers and Publishers, Inc., 1975. (IL/7).	Book	770
	8. Richter, H.P. Wiring Simplified. Minneapolis, Minnesota: Park Publishing Company, 1974. (MN/1).	Book	772
PLANNING AND INSTALLING THE MAIN SERVICE ENTRANCE	1. Kowalka, Ronald C. Distribution of Electricity on Home and Farm. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, 1974. (OH/2).	Book	770
	2. Electrical Wiring Procedures. VAS 3016a. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	772
	3. Agricultural Wiring Handbook. New York, New York: Agricultural Marketing Division, Edison Electric Institute, 1971. (NY/10).	Book	772
	4. Richter, H.P. Wiring Simplified. Minneapolis, Minnesota: Park Publishing, Inc., 1974. (MN/1).	Book	772
SELECTING AND MAINTAINING ELECTRIC MOTOR	1. Phipps, Lloyd J. Mechanics in Agriculture. Danville, Illinois: Interstate Printers and Publishers, Inc., 1967. (IL/7).	Book	700
	2. Wakeman, T.J. and McCoy, Vernon L. The Farm Shop. New York, New York: The Macmillan Company, 1960. (NY/8).	Book	780
	3. McKenzie, Bruce A. and Zachariah, Gerald L. Understanding and Using Electricity. Danville, Illinois: Interstate Printers and Publishers, Inc., 1975. (IL/7).	Book	770

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
SELECTING AND MAINTAINING ELECTRIC MOTOR (cont.)	4. Richter, H.P. Wiring Simplified. Minneapolis, Minnesota: Park Publishing Company, 1974. (MN/7).	Book	772
	5. Parady, W. Harold and Turner, J. Howard. Electric Motors: Selection, Protection, Drives. Athens, Georgia: American Association for Vocational Instructional Materials, 1972. (MI/1).	Book, slides and transparency masters are also available for this document.	773
	6. Electric Motors for Agriculture. New York, New York: Agricultural Marketing Group, Edison Electric Institute, 1971. (NY/10).	Student and teacher manual are available.	773

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
USING APPLIED MATHEMATICS IN SOLVING PRACTICAL AGRICULTURAL PROBLEMS	1. Applied Mathematics. Columbia, Missouri: Instructional Materials Laboratory, University of Missouri--Columbia. (MO/2).	Student Workbook	900/01
	2. Higgs, Roger, et al. Agricultural Mathematics. Danville, Illinois: Interstate Printers and Publishers, Inc. (IL/7).	Book, answer book also available for this document.	900/01
	3. Farm Accounting Problems. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University. (OH/2).	Pamphlet	900/01
	4. Pynnonen, Arthur. Vo-Ag Math Problems. Sheldon, Wisconsin: National Vo-Ag Book Company, 1969. (WI/2).	Student Workbook	900/01
KEEPING FARM BUSINESS RECORDS	1. Farm Records--A Management Tool. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, 1972. (OH/2).	Pamphlet	818
	2. Record Keeping on the Farm. VAS 2008a. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	818
	3. Roediger, Roger D. Farm Business Planning and Analysis. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, 1975. (OH/2).	Teaching Units	818
	4. Baker, T.G. and Brake, J.R. Extension Bulletin E-911. Cash Flow Analysis of the Farm Business. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1975. (MI/3).	Bulletin	818
	5. Baker, T.G. and Brake, J.R. Extension Bulletin E-911S. Cash Flow Analysis--Worksheet Supplement. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1975. (MI/3).	Bulletin	818

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
KEEPING FARM BUSINESS RECORDS	6. Herbst, J.H. Farm Management Principles, Budgets, Plans. Champaign, Illinois: Stipes Publishing Company, 1974. (IL/10).	Book	810
	7. King, Bob, ed. Facts and Figures For Farmers. St. Louis, Missouri: Doane Agriculture Service, Inc., 1972. (MO/3).	Book	810
	8. Doane's Farm Management Guide. St. Louis, Missouri: Doane Agriculture Service, 1973. (MO/3).	Book, teacher's guide and student workbook also available for this document.	810
	9. Credit in Agriculture. Louisville, Kentucky: Farm Credit Banks of Louisville, 1974. (KY/1).	Book, teacher's guide also available for this document.	832
	10. Herbst, J.H. Increasing Earnings Through Farm Records. VAS 353A. Urbana, Illinois: Vocational Agriculture Service, University of Illinois, 1975. (IL/2).	Filmstrip	818
	11. Setting Up Farm Records to Provide for Analysis. VAS 2037. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	818
	12. Starting to Keep Records. VAS 350A. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Filmstrip	818
	13. Keeping Records Up to Date. VAS 351A. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Filmstrip	818

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
PREPARING FARM BUDGETS	1. Herbst, J.H. Farm Management--Principles, Budget, Plans. Champaign, Illinois: Stipes Publishing Company, 1970. (IL/10).	Book	810
	2. Hinton, R.A. Extension Bulletin AE-4342. Farm Management Manual. Urbana, Illinois: Cooperative Extension Service, University of Illinois, 1973. (IL/8).	Bulletin	810
	3. Hinton, R.A. Income Possibilities Form. Urbana, Illinois: Cooperative Extension Service, University of Illinois. (IL/8).	Bulletin	818
	4. Unit Budgets for Major Livestock and Crop Enterprises. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, 1972. (IL/2)	Pamphlet	818
	5. North Central Publication No. 34.311A. Work Sheet: The Partial Budget. Madison, Wisconsin: Cooperative Extension Service, University of Wisconsin, 1974. (MI/3).	Bulletin	818
	6. Doane's Farm Management Guide. St. Louis, Missouri: Doane Agricultural Service, 1973. (MO/3).	Book, teacher's guide and student workbook also available for this document.	810
ANALYZING AND RECOMMENDING ADJUSTMENTS IN THE BUSINESS OPERATION	1. Herbst, J.H. Farm Management--Principles, Budgets, Plans. Champaign, Illinois: Stipes Publishing Company, 1970. (IL/10).	Teacher Reference Book	810
	2. Agricultural Business Management--Principles That Affect Production. VAS 2040. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	810
	3. Profit-Maximizing Principles--Instructional Units for Vocational Agriculture. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, 1970. (OH/2).	Teaching Units	810

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
ANALYZING AND RECOMMENDING ADJUSTMENTS IN THE BUSINESS OPERATION (cont.)	4. Roediger, Roger D. Farm Business Planning and Analysis. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, 1975. (OH/2).	Teaching Units	818
	5. Baker, T.G. and Brake, J.R. Extension Bulletin E-911. Cash Flow Analaysis of the Farm Business. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1975. (MI/3).	Bulletin	818
	6. Baker, T.G. and Brake, J.R. Extension Bulletin E-911S. Cash Flow Analysis--Worksheet Supplement. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1975. (MI/3).	Bulletin	818
	7. North Central Regional Publication No. 34.2. Where Am I? Analyzing Your Farm Financial Performance. Madison, Wisconsin: Cooperative Extension Service, University of Wisconsin, 1975. (MI/3).	Bulletin	818
	8. North Central Regional Publication No. 34.21A. Worksheet: Financial Statement. Madison, Wisconsin: Cooperative Extension Service, University of Wisconsin, 1974. (MI/3).	Bulletin	818
	9. North Central Regional Publication No. 34.21C. Worksheet: Comparative Trend Analysis--Agriculture. Madison, Wisconsin: Cooperative Extension Service, University of Wisconsin, 1974. (MI/3).	Bulletin	818
	10. Doane's Farm Management Guide. St. Louis, Missouri: Doane Agriculture Service, Inc., 1973. (MO/3).	Book, Teacher's guide and student workbook also available for this document.	810
	11. Summarizing and Analyzing Records. VAS 352A. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Filmstrip	818

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
FINANCING THE FARM OPERATION	1. Agriculture Credit Instruments. VAS 6007. Urbana, Illinois: Vocational Agriculture Service, University of Illinois, 1973. (IL/2).	Pamphlet	832
	2. Factors Involved in the Borrowing Process. VAS 2028A. Urbana, Illinois: Vocational Agriculture Service, University of Illinois, 1973. (IL/2).	Pamphlet	832
	3. Farm and Personal Finances. Danville, Illinois: Interstate Printers and Publishers, Inc., 1968. (IL/7).	Book	831
	4. Extension Circular 1042. Mechanics of Farm Financial Planning. Urbana, Illinois: Cooperative Extension Service, University of Illinois, 1971. (IL/8).	Bulletin	831
	5. Planning for Repayment of Loans. VAS 2026A. Urbana, Illinois: Vocational Agriculture Service, University of Illinois, 1969. (IL/2).	Pamphlet	832
	6. Sources of Farm Credit. VAS 2027. Urbana, Illinois: Vocational Agriculture Service, University of Illinois, 1973. (IL/2).	Pamphlet	832
	7. Using Farm Real Estate Loans. VAS 2033A. Urbana, Illinois: Vocational Agriculture Service, University of Illinois, 1974. (IL/2).	Pamphlet	832
	8. Herbst, J.H. Farm Management--Principles, Budgets, Plans. Champaign, Illinois: Stipes Publishing Company, 1974. (IL/10).	Book	810
	9. Doane's Farm Management Guide. St. Louis, Missouri: Doane Agriculture Service, Inc., 1973. (MO/3).	Book, teacher's guide and student workbook also available for this document.	810

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
FINANCING THE FARM OPERATION (cont.)	10. Credit in Agriculture. Louisville, Kentucky: Farm Credit Banks of Louisville, 1974. (KY/1).	Book, teacher's guide also available this document.	832
PLANNING FARM POWER, MACHINERY, AND EQUIPMENT NEEDS	1. Farm Accounting Problem. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University. (IL/2).	Pamphlet	811
	2. Herbst, J.H. Farm Management--Principles, Budgets, Plans. Champaign, Illinois: Stipes Publishing Company, 1974. (IL/10).	Book	810
DETERMINING AND SECRUING FARM INSURANCE	1. USDA Bulletin No. 2137. Insurance for Farmers. Washington, D.C.: U.S. Department of Agriculture, 1967. (DC/1).	Bulletin	838
	2. Extension Bulletin 1002. Life Insurance for Farm Families. Ithaca, New York: Cooperative Extension Service, Cornell University, 1967. (NY/7).	Bulletin	838
	3. Extension Bulletin E-409. Planning Family Insurance. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1968. (MI/3).	Bulletin	838
	4. Understanding Your Life Insurance. New York, New York: Institute of Life Insurance, 1972. (NY/11).	Pamphlet	838
	5. Keast, James D., et al. Do It Right the First Time. St. Louis, Missouri: Doane Agriculture Service, Inc., 1974. (MO/3).	Book	810 ✓
	6. Doane's Farm Management Guide. St. Louis, Missouri: Doane Agricultural Service, Inc., 1973. (MO/3).	Book	810
	7. Additional references for this topic can be obtained from your local insurance agents.		

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
FULFILLING FARM TAX RESPONSIBILITIES	1. Farmer's Tax Guide. Publication 225. Washington, D.C.: U.S. Treasury Department, Internal Revenue Service. (MI/6)	Pamphlet	837
	2. Extension Publication 2. Income Tax Management for Farmers. Madison, Wisconsin: Cooperative Extension Service, University of Wisconsin. (WI/1).	Bulletin	837
	3. Understanding Taxes. Publication 22. Washington, D.C.: U.S. Treasury Department, Internal Revenue Service. (MI/6).	Student Reference, teacher's guide also available for this publication.	837
INTERPRETING AND UTILIZING FARM LAW	1. Buescher, J. Law and The Farmer. New York, New York: Springer Publishing Company, 1975. (NY/12).	Book	817
	2. Law For the Farmer. VAS 2018B. Urbana, Illinois: Vocational Agriculture Service, University of Illinois, 1973. (IL/2).	Pamphlet	817
	3. Extension Circular 990. Legal Aspects of Crop Spraying. Urbana, Illinois: Cooperative Extension Service, University of Illinois, 1969. (IL/8).	Bulletin	817
	4. Extension Circular 1024. Water in Illinois--Use and Pollution Laws. Urbana, Illinois: Cooperative Extension Service, 1972. (IL/8).	Bulletin	817
	5. Hill, E.B. Extension Bulletin E-378. Farm Rental Agreements. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1966. (MI/3).	Bulletin	817

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
INTERPRETING AND UTILIZING FARM LAW (cont.)	6. Hepp, R.E. and Kelsey, M. Extension Bulletin E-731. General Partnership for Agricultural Producers. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1975. (MI/3).	Bulletin	817
	7. Hepp, R.E. and Kelsey, M. Extension Bulletin E-731A. Partnership Agreement Worksheet. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1975. (MI/3).	Bulletin	817
	8. Shapley, A.E. Extension Bulletin E-831. 1975 Revision: The Law and Michigan Agricultural Labor. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1975. (MI/3).	Bulletin	817
	9. Prewitt, L.R., Rippen, A., and VanPatten, K. Extension Bulletin E-880. Laws Affecting Grade A Milk Producers. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1975. (MI/3).	Bulletin	817
	10. North Central Regional Extension Publication No. 11. The Farm Corporation. Ames, Iowa: Cooperative Extension Service, Iowa State University, 1974. (MI/3).	Bulletin	817
	11. Extension Bulletin E-943. Michigan Farm Estate Planning. East Lansing, Michigan: Cooperative Extension Service, Michigan State University. (MI/3).	Bulletin	817
	12. Keast, James D. Do It Right The First Time. St. Louis, Missouri: Doane Agricultural Service, Inc., 1974. (MO/3).	Book	810
UNDERSTANDING THE FUNCTIONS AND OPERATIONS OF FARMER COOPERATIVES	1. Olsen, H.M. Some Principles and Practices of Farmer Cooperatives. Danville, Illinois: The Interstate Printers and Publishers, Inc. (IL/7).	Book	836

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
UNDERSTANDING THE FUNCTIONS AND OPERATIONS OF FARMER COOPERATIVES (cont.)	2. Roy, Ewell P. Cooperatives: Today and Tomorrow. Danville, Illinois: Interstate Printers and Publishers, Inc., 1969. (IL/7).	Book	836
	3. Schaars, Marvin A. Extension Bulletin A-1457. Cooperatives: Principles and Practices. Madison, Wisconsin: Cooperative Extension Service, University of Wisconsin. (WI/1).	Bulletin	836
	4. USDA Bulletin FCS 59. Farmer Co-ops--What Are They? Washington, D.C.: U.S. Department of Agriculture, 1969. (DC/1).	Bulletin	836
	5. USDA Bulletin AB275. Farmer Cooperatives--Farm Business Tools. Washington, D.C.: U.S. Department of Agriculture, 1970. (DC/1).	Bulletin	836
	6. Cooperatives--Distinctive Business Corporations (394). Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Filmstrip	836
	7. USDA Bulletin FCS 18. How To Start A Cooperative. Washington, D.C.: U.S. Department of Agriculture. (DC/1).	Bulletin	836
	8. Cooperatives: People With Purpose. Lansing, Michigan: Michigan Association of Farmer Cooperatives. (MI/8).	Slide-tape	836
	9. Lintner, J.H. Cooperation in a Free Enterprise Society with Emphasis on the Cooperative Way of Doing Business. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, 1973. (OH/2).	Ten Student Resource Units	836
	10. Additional references can be obtained from the American Institute of Cooperatives, 1129 20th Street, N.W., Washington, D.C. 20036.		

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
USING GOVERNMENTAL SERVICES	1. Credit in Agriculture. Louisville, Kentucky: Farm Credit Banks of Louisville, 1974. (KY/1). 2. Additional resource materials can be obtained from the district office of the various governmental agencies handling your area.	Book	832
PARTICIPATING IN FARM ORGANIZATIONS	1. Sponberg, H. Extension Bulletin E-294. The Meeting Will Come to Order: Simplified Guidelines to Parlimentary Procedures. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1974. (MI/3). 2. 4-H Bulletin 314D. Effective Control of Meetings. East Lansing, Michigan: Cooperative Extension Service, Michigan State University. (MI/5). 3. Membership--The Pathway to Leadership. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, 1972. (OH/2).	Bulletin Bulletin Pamphlet	802 802 802
PERFORMING GENERAL OFFICE DUTIES	1. Paris, Lillian and Miller, Bessey M. Complete Secretary's Handbook. Englewood Cliffs, New Jersey: Prentice-Hall, Inc. (NJ/1). 2. Office Procedures Used in the Agricultural Services. Columbus, Ohio: Agricultural Education Curriculum Materials Service, The Ohio State University. (OH/2). 3. E.E. Trotter and J.H. Herbst. Human Relations in Agricultural Business. VAS 6003. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2). 4. E.E. Trotter and J.H. Herbst. Agricultural Business Procedures. VAS 6004. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Book Pamphlet Pamphlet Pamphlet	900/14 900/14 900/60 900/10

MODULE TITLES	SELECTED REFERENCES	TYPE OF MATERIALS	AGDEX NUMBERS
OUTLETS FOR PRODUCTS	1. Marketing Agricultural Products. VAS 2016a. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	840
	2. Doane's Farm Management Guide. St. Louis, Missouri: Doane Agricultural Service, Inc., 1973. (MO/3).	Book, teacher's guide and student study guide are also available.	810
	3. Agricultural Marketing Principles. Columbia, Missouri: Instructional Materials Laboratory, University of Missouri--Columbia. (MO/2).	Teacher's Manual	840
	4. Carey, Tom, et al. Profit Marketing. St. Louis, Missouri: Doane Agricultural Service, Inc., 1975. (MO/3).	Book	840
PLANNING WORK SCHEDULES AND SUPERVISING EMPLOYEES	1. Balancing The Labor Supply and The Farm Business. VAS 2035. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. (IL/2).	Pamphlet	810
	2. Herbst, J.H. Farm Management--Principles, Budgets, Plans. Champaign, Illinois: Stipes Publishing Company, 1970. (IL/10).	Book	810
	3. Simplifying Work in an Agricultural Business. VAS 6006. Urbana, Illinois: Vocational Agriculture Service, University of Illinois, 1972. (IL/2).	Pamphlet	810

APPENDIX C

Key to Sources

KEY TO SOURCES

CODE	STATE	SOURCE AND ADDRESS
AZ/1	Arizona	Department of Agriculture Education University of Arizona Tucson, Arizona 85721
CA/1	California	Vocational Education Productions California Polytechnic State University San Luis Obispo, California 93402
CA/2	California	Lane Magazine and Book Company Menlo Park, Californa 94025
CA/3	California	W.H. Freeman and Company 660 Market Street San Francisco, California 94104
CO/1	Colorado	Sheep Industry Development Program, Inc. 200 Clayton Street Denver, Colorado 80206
CO/2	Colorado	Agricultural Education Section Colorado State University 530 Peterson Street Ft. Collins, Colorado 80521
DC/1	District of Columbia	Superintendent of Documents U.S. Government Printing Office Washington, D.C. 20402
DC/2	District of Columbia	Animal Health Institute 1717 K Street, N.W. Suite 1009 Washington, D.C. 20006
IL/1	Illinois	John Deere Service Publications Department F John Deere Road Moline, Illinois 61265
IL/2	Illinois	Vocational Agriculture Service 434 Mumford Hall University of Illinois Urbana, Illinois

CODE	STATE	SOURCE AND ADDRESS
IL/3	Illinois	Goodheart-Willcox Company 123 W. Taft Drive South Holland, Illinois 60473
IL/4	Illinois	American Technical Society 5608 Stoney Island Avenue Chicago, Illinois 60637
IL/5	Illinois	Chas. A. Bennett Company 809 W. Detweiller Drive Peoria, Illinois 61614
IL/6	Illinois	Farm Department National Safety Council 425 North Michigan Chicago, Illinois 60611
IL/7	Illinois	Interstate Printers and Publishers, Inc. Danville, Illinois 61832
IL/8	Illinois	Extension Bulletin Office Cooperative Extension Service University of Illinois at Urbana-Champaign Urbana, Illinois 61801
IL/9	Illinois	A&L Publications Station A, Box F Champaign, Illinois 61820
IL/10	Illinois	Stipes Publishing Company Champaign, Illinois 61820
IL/11	Illinois	National Livestock and Meat Board 36 S. Wabash Avenue Chicago, Illinois 60603
IN/1	Indiana	The Bobbs-Merrill Company, Inc. Educational Publishign Division Continuing Education & College Department 4300 W. 62nd Street Indianapolis, Indiana 46268
IN/2	Indiana	The Thompson Publishing Company Box 50160 Indianapolis, Indiana 46250

CODE	STATE	SOURCE AND ADDRESS
IA/1	Iowa	IAVIM Center ATTN: Thomas A Hoerner Agriculture Engineering Department Iowa State University Ames, Iowa 50010
IA/2	Iowa	Extension Bulletin Office Cooperative Extension Service Iowa State University Ames, Iowa 50010
IA/3	Iowa	Iowa State University Press South State Avenue Ames, Iowa 50010
IA/4	Iowa	Kendall/Hunt Publishing Company 2460 Kerper Blvd. Dubuque, Iowa 52001
KY/1	Kentucky	The Public Relations and Information Department Farm Credit Banks of Louisville P.O. Box 239 Louisville, Kentucky 40201
MA/1	Maryland	Sprinkler Irrigation Association 13975 Conneticut Avenue Silver Springs, Maryland 20906
MA/2	Maryland	The Williams and Wilkins Company 428 E. Preston Street Baltimore, Maryland 21202
MI/1	Michigan	Agriculture and Natural Resources Education Institute 410 Agriculture Hall Michigan State University East Lansing, Michigan 48824
MI/2	Michigan	Michigan State University Placement Services Room 146 Student Services Building Michigan State University East Lansing, Michigan 48824
MI/3	Michigan	Extension Bulletin Office Cooperative Extension Service Michigan State University East Lansing, Michigan 48824

CODE	STATE	SOURCE AND ADDRESS
MI/4	Michigan	General Motors Corporation Public Relations Department Detroit, Michigan 48202
MI/5	Michigan	4-H Bulletin Office 175 South Anthony Hall Michigan State University East Lansing, Michigan 48824
MI/6	Michigan	Training Branch U.S. Treasury Department P.O. Box 84 Detroit, Michigan 48231
MI/7	Michigan	Beverly Tallman The John Henry Company P.O. Box 1410 Lansing, Michigan 48904
MI/8	Michigan	Michigan Association of Farmer Cooperatives P.O. Box 30960 Lansing, Michigan 48909
MN/1	Minnesota	Hobar Publications 1305 Tiller Lane St. Paul, Minnesota 55112
MN/2	Minnesota	Extension Bulletin Office Cooperative Extension Service University of Minnesota St. Paul, Minnesota 35108
MO/1	Missouri	Monsanto Company 800 N. Lindberg St. Louis, Missouri 63166
MO/2	Missouri	Mr. Amon Herd, Director Instructional Materials Laboratory 10 Industrial Education Building University of Missouri--Columbia Columbia, Missouri 65201
MO/3	Missouri	Doane Agricultural Service, Inc. 8900 Manchester St. Louis, Missouri 63144
NJ/1	New Jersey	Prentice-Hall, Inc. Englewood Cliffs, New Jersey 07632

CODE	STATE	SOURCE AND ADDRESS
NY/1	New York	Union Carbide Corporation Linde Division 270 Park Avenue New York, New York 10017
NY/2	New York	McGraw-Hill Book Company, Inc. 330 West 42nd Street New York, New York 10039
NY/3	New York	Brooklyn Botanic Garden 1000 Washington Avenue Brooklyn, New York 11225
NY/4	New York	Oxford University Press 200 Madison Avenue New York, New York 10016
NY/5	New York	Ronald Press 79 Madison Avenue New York, New York 10016
NY/6	New York	Cornell University Instructional Materials Service Ithaca, New York 14850
NY/7	New York	Extension Bulletin Office Cooperative Extension Service Cornell University Ithaca, New York 14850
NY/8	New York	The Macmillan Company 866 Third Avenue New York, New York 10022
NY/9	New York	Bruce Publishing Company 400 North Broadway Milwaukee, Wisconsin 53202
NY/10	New York	Agricultural Marketing Group Edison Electric Institute 90 Park Avenue New York, New York 10016
NY/11	New York	Institute of Life Insurance 277 Park Avenue New York, New York 10017

CODE	STATE	SOURCE AND ADDRESS
NY/12	New York	Springer Publishing Company, Inc. 200 Park Avenue, South New York, New York 10003
NY/13	New York	John Wiley & Sons, Inc. 440 Park Avenue, South New York, New York 10016
OH/1	Ohio	James F. Lincoln Arc Welding Foundation P.O. Box 3035 Cleveland, Ohio 44117
OH/2	Ohio	Ohio Agricultural Education Curriculum Materials Service The Ohio State University Room 254, 2120 Fyffe Road Columbus, Ohio 43210
OH/3	Ohio	Extension Bulletin Office Cooperative Extension Service The Ohio State University Columbus, Ohio 43210
PA/1	Pennsylvania	Extension Bulletin Office Cooperative Extension Service Pennsylvania State University University Park, Pennsylvania 16802
PA/2	Pennsylvania	Sperry New Holland New Holland, Pennsylvania 17557
PA/3	Pennsylvania	Lea & Febiger 600 South Washington Square Philadelphia, Pennsylvania 19106
SC/1	South Carolina	Extension Bulletin Office Cooperative Extension Service Clemson University Clemson, South Carolina 29631
TX/1	Texas	Vocational Instructional Service F.E. Box 182 Texas A&M University College Station, Texas 77843
VA/1	Virginia	National Concrete Masonry Association 1800 N. Kent Arlington, Virginia 22209

CODE		
VA/2	Virginia	Extension Bulletin Office Cooperative Extension Service Virginia Polytechnic Institute and State University Blacksburg, Virginia 24061
WI/1	Wisconsin	Extension Bulletin Office Cooperative Extension Service University of Wisconsin Madison, Wisconsin 53706
WI/2	Wisconsin	National Vo-Ag Book Company Sheldon, Wisconsin 54766
WI/3	Wisconsin	The Highsmith Company, Inc. P.O. Box 150 Fort Atkinson, Wisconsin 53538
WI/4	Wisconsin	Midwest Breeders Cooperative Shawano, Wisconsin 54166